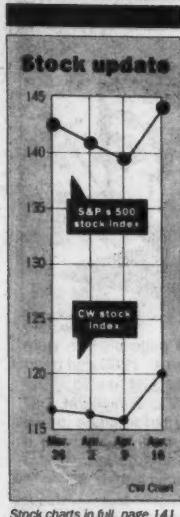


COMPUTERWORLD

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APRIL 21, 1986

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The IRS lacks an adequate disaster recovery plan and risks prolonged systems disruptions, a GAO study says. **Page 13.**

A switching system program's logic error causes a phone company to underbill customers by \$35 million. **Page 41.**

Communications managers search for more management tools to operate multi-vendor systems. **Page 31.**

Users struggle to manage increasing amounts of computer-aided design and manufacturing data. **Page 2.**

IBM's 8100 will not be functionally enhanced in the future, but the DPPX operating system may be moved over to 370-based systems. **Page 6.**

Wang Laboratories introduces a voice and data system using telephone equipment from Telenova, Inc. **Page 12.**

DEC last week reported sharply higher earnings for its third fiscal quarter ended March 29. Profits skyrocketed 86% to \$170.3 million from \$91.7 million a year ago, while per-share earnings jumped from 76 cents to \$1.32. The jump came on just a 14% gain in revenue, from \$1.69 billion to \$1.93 billion. Vice-President and Chief Financial Officer James M. Osterhoff said new product sales and continued cost controls returned DEC to double-digit operating margins. Many other companies reported quarterly results last week, including Wang and Honeywell. **Page 142.**

IBM last week apparently won the two-year-long race against several Japanese vendors to install 1M-bit memory chips in its 3090 mainframes. At the same time, IBM advanced delivery of those mainframes by one to four months. **See NEWS page 4**

AI tool seeks wider market

Application delivery focus of low-end Symbolics unit

By Eric Bender

NEW YORK — Symbolics, Inc., which launched the market for dedicated symbolic-processing machines in the early 1980s, last week took another major step aimed at commercializing artificial intelligence technology by introducing its first system designed for end users rather than software developers.

Priced at least one-third below previous Symbolics models, the 3601AE applications delivery system is designed to increase the cost-effectiveness of running artificial intelligence-based packages, President Russell Noftsker said.

See AI page 4

IBM hooks Token-Ring to 370 hosts

By Douglas Barney

IBM last week moved to fill several critical gaps in its Token-Ring network introduced last fall. The company announced products to provide connections between networked Personal Computers and 370-family mainframes, System/36 minicomputers and Series/1 processors.

"The local-area network announcements today fill a number of holes," said Robert F. Steen, systems manager, network systems, for IBM's Communication Products Division. "The first is the lack of direct connection to the mainframe." Many of the products will not be available until 1987, however.

Reaction was positive at one large corporation that has already invested in To-

See IBM page 8

Tandem boosts Nonstop line

By Jeffry Beeler
and David Bright

CUPERTINO, Calif. — Capping a five-year proprietary chip development effort, Tandem Computers, Inc. last week introduced a mainframe-class transaction processing system that reportedly boasts twice the throughput of the firm's largest existing processor.

According to Tandem President Jim Treybig, the latest addition to the company's line rivals, in its maximum configuration, the computing speed of IBM's 3090. Such performance levels are crucial to the new system's target market, users clus-

See TANDEM page 10

Ford tying PC Network to factory automation

By Peggy Watt

DETROIT — Ford Motor Co. is working with IBM to develop and install a continentwide broadband network linked with internal local-area networks at 26 Ford assembly plants throughout North America.

At least 100 IBM Personal Computers will be installed at each plant, beginning with the assembly plant in Wayne, Mich. Work on the Wayne plant system began last week.

Ford's IBM network will provide plant foremen with the usual electronic mail and file-sharing capabilities of a local-area network, plus gateways to Ford's mainframes and ASCII asynchronous access to on-site minicomputers. The ASCII gateway, being

See FORD page 9

CW EXCLUSIVE

Publish or perish: Start-up grabs early page language lead

By Peggy Watt

PALO ALTO, Calif. — The unsung hero of the desktop publishing phenomenon is a 44-employee company founded in 1982 whose Silicon Valley offices have recently welcomed a stream of negotiators from better known high-tech firms.

The company is Adobe Systems, Inc., and two years ago, its sole product, the page description language Postscript, was picked by Apple Computer, Inc. as the composition language for Apple's LaserWriter printer.

Since Apple introduced the LaserWriter in 1985, Postscript drivers have been implemented on all four of the standard engines used in the majority of the

200 or so laser printer models on the market (see Product Spotlight, page 45). The only major holdouts are Hewlett-Packard Co. and IBM, which both use proprietary page command languages in their printers.

Adobe has covered ground rapidly for a young company; it was founded by two former Xerox Palo Alto Research Center scientists who originally helped develop Xerox's Interpress language. Both founders remain active: John Warnock is a president who likes to experiment with the latest applications, and Charles Geschke, executive vice-president, still works in development.

Warnock says he believes Postscript will not only become a standard for desktop publishing but will help unify the larger electronic publishing industry by branching to typesetters and dedicated systems.

"Typesetting firms that aren't paying attention to this are going to be in trouble," he says.

Printing jobs usually contracted out or sent to the in-house print shop are slowly moving inside individual departments that can produce publications or documents with a microcomputer and laser printer.

Some typesetting systems will

See START-UP page 14



Warnock

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NEWS

Users ponder CAD/CAM data base management woes

Conference features no clear solution to growth of data

By Rosemary Hamilton

FRAMINGHAM, Mass. — Computer-aided design and manufacturing (CAD/CAM) professionals are struggling to find ways to manage increasing amounts of data and are finding no clear direction emerging.

A two-day conference sponsored by "CAD/CIM Alert," a publication from Management Roundtable, Inc. in Chestnut Hill, Mass., was held last week to address the problem. Many issues were raised, but no firm answers were provided. There were 20 data management methods presented by users and vendors alike. Each had its own twist, and most were only partial solutions.

E. F. Codd, the designer of the original relational data base model who has sparked debates in the DP/MIS community with his controversial theorems, could not even capture his audience's attention, much less stir up a heated discussion. Perhaps it was because Codd was the last in a long line of presenters trying to sell their ideas. Codd warned his listeners, "If you develop a CAD/CAM system, it had better be, for your sake, on a relational foundation."

— E. F. Codd
Codd & Date Consulting Group

If you develop a CAD/CAM system, it had better be, for your sake, on a relational foundation.'

Nonetheless, Peter Marks, a vice-president of Automation Technology Products, who spoke at and coordinated the CAD/CAM Databases '86

— Control for the Decade Ahead Conference, said he was pleased with the conference. Acknowledging that there are no solid answers today, he said the fact that more vendors are now involved — 13 vendors discussed their data management capabilities as opposed to three last year — shows that this area is finally gaining attention and is at least on the road to finding solutions.

CAD/CAM data management has a wealth of problems associated with it. Some are typical data management problems, while others are exclusive to the field.

For starters, many CAD/CAM environments have the common problem of linking multivendor systems. As a result, a central data base that all systems can access is not easy to find on the market and is difficult to develop in-house. Said Robert Glaser, a product marketing manager at Intergraph Corp., "No one is walking into this with a clean slate. We all have to think of interfaces."

Beyond that, a centralized data base for a corporation's CAD/CAM department is barely economically or technologically feasible, especially for large organizations. According to Marks, the amount of information required to build a commercial aircraft

is estimated at one million gigabytes. To store all this information on a system, a user would need two million 500-MB disk drives, Marks said.

There was disagreement among the vendors at the conference as to how one would store data. Some vendors, such as Intergraph Corp., offer a system that maintains graphical data in one data base and text data relating to the graphical information in a separate data base. Other vendors, such as Computervision Corp. and Digital Equipment Corp., maintained that "data is data" and can be stored in one data base.

Still another option was presented by Hewlett-Packard Co. Pat Adiamak, technical DBMS product manager, said that data bases alone are not the issue. "In terms of managing data, it's often on multiple vendors' systems, and a lot of the data is still on paper. A solution would be a centralized directory that tracks where all the data resides."

Because the issues have yet to be sorted out, vendors are currently "not supplying solutions for all our needs," Marks said. So in the meantime, users are tackling the problems in whatever way is economically possible. At some of the bigger sites, like Ford Motor Co. and General Dynamics Corp., internal software projects are under way.

Doug Lewis, director of CAD/CAM at General Dynamics, said his company dismissed the idea of developing one centralized data base and has instead opted for a centralized meta-data base, or a centralized data base for information regarding CAD/CAM data. The company is working with Computer Corporation of America to develop this customized system.

"We want to blur it to a point where it doesn't matter where we put the data," Lewis said.

The idea is to manage a centralized data base that is updated automatically on the status of all CAD/CAM data. Users can then access the meta-data base to locate specific data.

At Ford, a hierarchical data management technique is under development, according to Wayne Hamann, manager of computer-aided engineering systems development.

In this case, the highest level is a centralized directory that functions like a card catalog in a library by giving an overview of corporatewide CAD/CAM activity. Below that is the mid-level data base, which functions in a similar manner to the corporate-wide directory but is designed for various CAD/CAM divisions.

Next would come local data bases with "more detailed and refined information" on specific projects or departments, according to Hamann. The local data base would have limited access, since most of the data revisions would be made at this level.

The software for this system has been developed internally. A pilot project is under way in Europe, Hamann said, and may eventually be marketed commercially.

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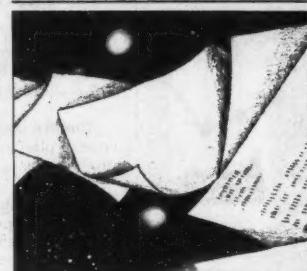
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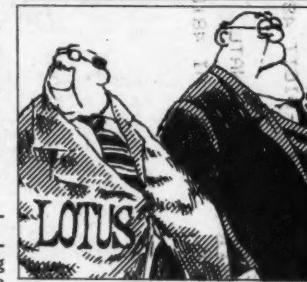
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NEWS

Compaq, HP offer price cuts on IBM-compatible micros

Portable line discounts range from 3.5% to 17%

By Peggy Watt

It did not take IBM Personal Computer-compatible makers long to react to the price cuts announced earlier this month by IBM. Last week, Compaq Computer Corp. unveiled new models of two computers, and Compaq and Hewlett-Packard Co. cut prices on their personal computers.

The other major compatibles manufacturer, AT&T, gave no indication of plans to cut prices on its PC 6300 line, but a spokesman pointed out that AT&T dropped the price of the hard disk, single-floppy model from \$4,985 to \$4,485 in February.

IBM cut prices on models of its hard disk-equipped Personal Computer XT and 80286-based Personal Computer AT as much as 25% and dropped the price on its basic Personal Computer from \$1,595 to \$1,095 [CW, April 7].

Compaq, of Houston, introduced new high-end models of its Compaq Portable II and Compaq Deskpro 286,

each with a 20M-byte hard disk drive instead of the earlier models' 10M-byte drives. The new Model 4 of the Portable II is \$4,999 with \$350 upgrades for Model 3 owners available until June 16. The new Deskpro 286 Model 3 will replace the earlier configuration at a 26% lower price, \$3,144.

Other price cuts ranged from 3.5% to nearly 17% across the line of Compaq Portable 286 models, Compaq Deskpros and Compaq Deskpro 286s.

Palo Alto, Calif.-based HP likewise cut prices of its Vectra Personal Computer as much as 10%, depending on configuration, and dropped the prices for system components and accessories by as much as 40%. The biggest cut was in the high-end Vectra Office Model 2, with 640K bytes of random-access memory, one 360K-byte floppy disk drive, 20M-byte hard disk, color adapters and lock, down to \$5,299 from \$5,984.

Internal hard disk drives dropped 8% to 14% in price. The price of a 128K-byte memo" expansion kit fell from \$125 to \$75, and 1.2M-byte internal floppy disk drives dropped from \$450 to \$275.

TOP OF THE NEWS

NEWS from page 1

The delivery schedule now has the four-processor 3090 Model 400, which already had its shipments advanced once before, being delivered in October rather than November, and the Model 150 uniprocessor being shipped in June rather than October. The memory chip, developed at IBM's Essex Junction, Vt., semiconductor plant, will be used for memory upgrades and model upgrades in 3090s.

Mips Computer Systems, Inc. next month will introduce a line of semiconductors based on its proprietary reduced instruction set computer technology. Prime Computer will use the chips in the RISC-based machine it plans to introduce early next year.

Financially troubled microcomputer software distributor, First Software Corp. of Lawrence, Mass., has been put up for sale because of creditor demands. Sources close to the firm indicate that Solitaire, Inc., a Hayward, Calif., company owned by John Martin-Musumeci, has signed a letter of intent to acquire at least half of First Software.

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on development models by up to 25%. With the 3610 scheduled to ship in volume in October, Nofsker estimated that between 100 and 200 systems will be sold by year-end. He predicted more rapid growth during 1987.

Incorporating proprietary gate-array very large-scale integrated technology, the 3610 offers the same performance as Symbolics' 3640 development system, which will continue to be offered, but takes up about one-quarter the volume. The 3610 carries a single-quantity sticker price of \$44,900 that drops as low as \$31,500 in volume sales.

The system features a 19-in. monochrome console, 4M bytes of internal memory, 190M bytes of hard-disk storage and a runtime version of the firm's LISP environment software.

The 3610 was not demonstrated in action because the system software is not fully mature, Nofsker said. But the new machine still drew favorable reviews from analysts and

software vendors, who said it should quicken the commercial acceptance of AI-based software.

Newquist estimated this year's market for dedicated symbolic processors at \$180 million, with overall hardware spending on AI pegged at \$510 million. Symbolics' current annual sales will exceed \$120 million, according to Nofsker.

Philip Cooper, president of Palladian Software Corp. in Cambridge, Mass., called the 3610 "unveiling great news, although it's not a surprise." It demonstrates Symbolics' intentions to become much more competitive with the general-purpose 32-bit workstations that represent another option in delivering AI applications, he said.

"Overall, it's a good move," said Curt Monash, senior vice-president at Paine Webber, Inc., who forecast that the 3610 will be well positioned to capture the high end of the AI delivery market — when that market finally appears.

Nofsker downplayed what many see as a major threat from Texas Instruments, Inc.'s upcoming LISP-on-a-chip processor. "They're starting so far behind in technology that they can't make it up by exploiting their expertise in silicon," he told *Computerworld*.

New features in Symbolics' LISP 7 primarily target an integrated development/development environment, with enhancements designed to boost both programmer productivity and ease-of-use features in the resulting applications. Speed reportedly also will increase about 25%.

Revised pricing for development systems ranges from \$49,900 for a low-end System 3640 to \$116,900 for a System 3675. Symbolics also cut memory prices by about one-third, introduced a 368M-byte disk drive for some 3640 models and announced a 515M-byte disk drive for 3670s priced at \$17,000.

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IBM freezes 8100, considers moving DPCX to 370 hosts

By James Connolly

RYE BROOK, N.Y. — Introduced as a key element in a distributed processing strategy in 1978, IBM's 8100 Information System apparently has suffered a quiet but long-predicted death.

IBM officials confirmed last week that the 8100 hardware family and the DPCX operating system will not be functionally enhanced in the future, but they assured users that the 8100's other operating system, DPPX, will be enhanced and is being considered for a move onto 370-based systems.

IBM's Data Systems Division reportedly first issued its 100-word statement on the 8100 last month at the Guide and Share IBM users groups' meetings in Anaheim, Calif., which were closed to the press.

An IBM spokesman said last week that the 8100 is still available and will be sold to customers where it meets customer requirements. He said the evaluation of moving DPPX into the 370 environment will be completed in early 1987.

Although the spokesman said that DPCX is stabilized and that no functional enhancements are planned, IBM announced the next day the availability of DPCX Release 6 and Release 6 of Distributed Office Support Facility (DOSF).

DPCX Release 6, which the company said was not a major functional change, adds support for DOSF Release 6. DOSF Release 6 was designed to add several print functions and to support IBM's Personal Computer AT, Portable PC, Quietwriter, Wheel-printer, Proprietary and Jet Printer.

While decisions to stop enhancing products sometimes are met with anger, one 8100 specialist viewed the

IBM announcement as good news.

"No one expected something called the 8100 to go on forever. What the users are concerned about is having to rewrite all of their applications. I think the only surprise is that IBM made a public statement and revealed as much as they did, that they are thinking about porting over an operating system to another architecture," said William Ackermann, vice-president for distributed systems at DPX, Inc., a Cupertino, Calif., systems house that publishes the "Update/8100" newsletter.

Ackermann said he expects DPPX to show up on a new small 370-based system. "DPPX users have known that they were going to have to migrate to new hardware. It is part of doing business in today's market," he added.

International Data Corp.'s IBM analyst, Frank Gens, said of the announcement, "It's not too surprising since we have been talking about it for three years now. It is just a little earlier than some people expected. IBM as a manufacturer has a requirement to produce a limited number of high-volume hardware lines."

Genes estimated that the 8100 family had an installed base of only 15,000 systems at the end of 1985. He said the product line had been squeezed out of the mid-range market by other IBM systems.

The 8100 suffered because of its high price and its performance. It suffered when compared with the 4331 and 4341 because it was viewed as being underpowered in comparison with those systems. If you looked at it as a PC server, it was viewed as an expensive PC server when compared with the Series/1, the System/36 and even the System/34," he said.

Sperry expands Series 5000

Mid-range, high-end supermicros broaden Unix-based family

By James Connolly

BLUE BELL, Pa. — With its sights set on new customers rather than on its installed base in the scientific, educational and energy fields, Sperry Corp. last week added two models to its Unix-based Series 5000 microcomputer family.

The 5000/50 and the 5000/80 use AT/T's Unix System V and the Motorola, Inc. 68020 microprocessor rather than the Motorola 68010 that was the CPU in the earlier Series 5000 systems.

The Model 50, supporting up to 32 interactive users, fits near the existing Model 60 at the mid-range of the Series 5000 family, while the Model 90, with room for up to four CPUs supporting 88 interactive users, is the new high-end system in the Series 5000 line.

Aimed at new accounts

A company representative said the Series 5000 is aimed more at new accounts than at existing customers.

The Model 50, made for Sperry by NCR Corp., uses a 16.67-MHz CPU and features up to 16M bytes of random-access memory (RAM) and 8K bytes of cache memory. A Motorola

68881 floating-point processor is optional.

A minimum configuration of the Model 50 includes the CPU, 8K bytes of cache, 2M bytes of RAM, an 85M-byte hard disk, a 45M-byte streaming cartridge tape, eight asynchronous ports, two synchronous ports and one parallel port. The Model 50 is available now at prices ranging from \$23,030 to \$28,530 for basic hardware.

RAM memory range of 4M to 16M bytes

The Model 90 has a memory range of 4M to 16M bytes of RAM and supports 8K bytes of cache and a standard 68881 floating-point processor.

A minimum configuration includes a CPU, the floating-point processor, 8K bytes of cache, 4M bytes of RAM, a 160M-byte fixed disk, a 45M-byte streaming tape, a four-channel direct memory access controller, 16 synchronous or asynchronous ports and two parallel ports.

The direct memory access controller permits a maximum of 16 disk drives or tape drives for a maximum storage capacity of 8G bytes. Basic hardware costs \$68,300 to \$74,300. The Model 90 will be available in June.

System options, workstations and software licenses are priced separately.

Field upgrades for the existing Models 40, 60 and 80 will be available in July.

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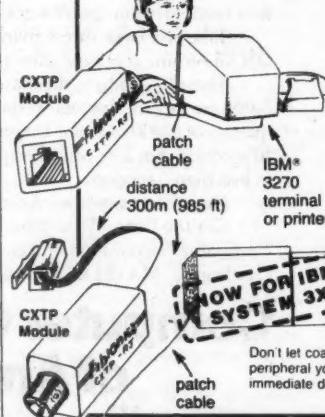


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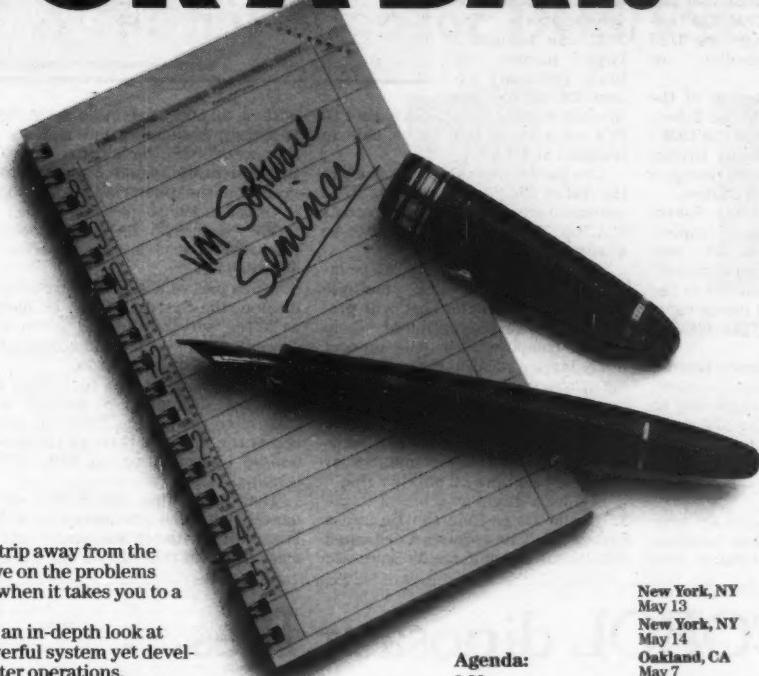
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NEWS

IBM links 370 to Token-Ring

From page 1

ken-Ring. "We at Travelers believe that the Token-Ring is a strategic element in a large company's data processing environment," said Dave Kimball, marketing director for Pack-ET/PC, Inc., a Farmington, Conn.-based spin-off of the Travelers Insurance Co. of Hartford, Conn. "There are a lot of great communications things that are coming down the road, and the Token-Ring gives us a little more horsepower to take advantage of them."

When all the announced IBM products become available, the Token-Ring could serve as an integral part of a corporation's overall information processing strategy, users claimed. The Token-Ring will be able to connect to other Token-Rings, and up to eight rings can simultaneously communicate with the IBM 370 family of mainframes through the 3725 communications controller or through a System/36.

"We think the connection of the System/36 and the 370 to the Token-Ring significantly strengthens IBM's office scenario," said Marty Gruhn, vice-president of the Sierra Group, a Tempe, Ariz.-based research firm.

Gruhn cautioned that the Token-Ring may be an expensive proposition for most corporations. "Our estimates are that it costs approximately \$8,500 to attach a System/36 to the Token-Ring. That is not inexpensive for just an attachment," Gruhn also said.

IBM announced a special feature on the 3725 communications controller that will attach a Token-Ring to the 3725 and through the 370 channel to the mainframe. "This will fill a need for the much-ballyhooed high-speed micro-to-mainframe link," Steen said.

"The announced products are very helpful," said Alex Stankus, telecommunications manager for Allied Ben-

dix Aerospace headquarters in Arlington, Va. The direct connection from the Token-Ring to the 3725 controller is especially of interest, Stankus said, but he plans to wait until he can see it work before making a purchasing decision.

IBM's Steen said that figures were not yet available for aggregate data rates supported by the 3725. Throughput speeds of individual PC-to-mainframe connections, he added, would depend on a number of factors, such as the size of the message, amount of traffic and how many rings the device supports. "The 3725 can support a large number of lines; you can't expect 4M bit/sec. per

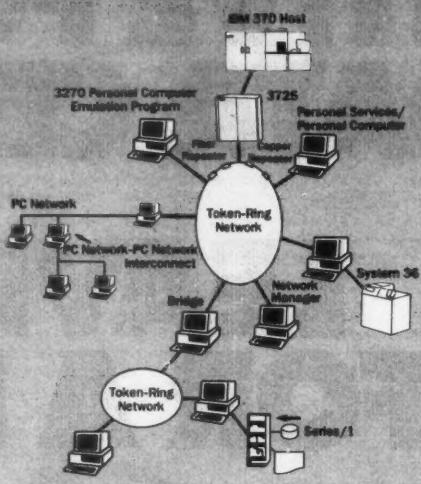
line any more than you can expect 10 PCs on token-ring to be able to transmit at 4M bit/sec."

The hardware required to connect the Token-Ring to an existing 3725 communications controller costs \$26,760. These products will not be available until January 1987.

Because up to 260 nodes can be attached per Token-Ring, multiple rings attached to the host will provide wide-scale connection of PCs to a host computer. "It will support fairly large numbers of users, meaning up to a thousand or maybe more," Steen said. However, a personal computer on one ring can identify, and therefore communicate with, a maximum of 16 personal computers or software programs on another ring.

Besides a direct attachment to the 3725, the Token-Ring can tie into a System/36. This requires a dedicated IBM Personal Computer AT equipped

IBM connectivity: Local-area network-level



Information provided by IBM's Information Systems Group.

with a \$2,500 System/36 LAN Attachment; communications software that costs \$925; the latest release of the System/36 System Support Program; and the token-ring PC Adaptor II, priced at \$895.

The System/36 LAN Attachment feature will be available in second-quarter 1987.

When part of a Token-Ring configuration, the System/36 can be used as a file server, allowing users to share data, store files and access applications on the System/36.

Users can download files from a 370 host through a System/36 to their microcomputers. They can also access the 370 host through the System/36 by emulating an IBM 3270 terminal.

The Token-Ring itself was enhanced with the announced \$1,495 Token-Ring Network Manager, a software program that allows an opera-

tor on a dedicated micro to evaluate the status of a single ring and perform problem determination and error monitoring. Workstation network adapters monitor network traffic and notify the Network Manager when network noise or frequency of errors exceeds a predetermined figure, Steen said.

Once the Network Manager has identified a network failure, it can remotely disconnect the workstation from the ring and bring it up later when the problem is solved. The product will be available in July 1986.

Also announced was Series 1 Office Connect, which allows the Series 1 to act as a communications server to both IBM and non-IBM systems. Priced at \$6,000, it will be available in first-quarter 1987.

IBM also enhanced the Token-Ring's ability to communicate over long distances with the announcement of the 8219 optical fiber repeater and the 8218 copper repeater, which amplify the signal on network wiring and will be available in June 1985. The \$1,650 optical repeater extends the network's range to 2 kilometers between wiring closets and between buildings, while the \$1,095 copper repeater extends the range to 2,500 feet.

Multiple repeaters

Multiple repeaters can be used to increase the network's range. Token-Ring networks can be linked through the new Token-Ring Network Bridge Program, which costs \$1,495 and requires a dedicated PC AT. The Token-Ring Network/IBM PC Network Interconnect Program, a previously announced product, now also can bridge between PC Networks. Additionally, the PC Network can share the same broadband cabling media as industrial local-area networks that use the Manufacturing Automation Protocol (see related story, page 1).

Although shipment of many important pieces of the Token-Ring is close to a year away, some products will be available this year. "The ring-level products, the network manager, the bridge and a new higher performance card that is available for the PC for servers, are available within the next three months. Those are things that generally don't take a lot of planning," Steen said.

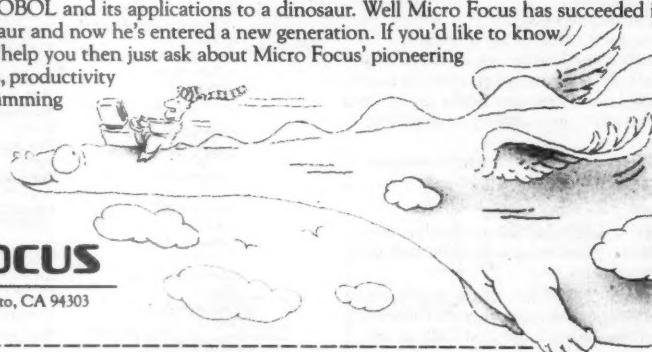
Still missing, however, are communications applications that will enable IBM PCs to communicate as peers with System/36s and 370 hosts via the new Token-Ring based connections. "Those functions will be based on the APPC code that just became available. It will take time for people to write those applications," Steen said.

Corporations can soon begin to plan and implement some elements of an overall Token-Ring strategy. "You can begin to install the applications you want to install, including applications that will be accessed through a direct connection to the 3725. However, you can't install them in the direct connection. You have to run them over a communications line," Steen said.

Senior Editors Elisabeth Horwitt and Eric Bender contributed to this report.

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Ford installing PC Network

From page 1

developed jointly by Ford and IBM, could appear later on the market as a new IBM communications option, according to a source at Ford.

The broadband network does not displace Ford's continuing plans to implement the Manufacturing Automation Protocol (MAP) for manufacturing applications at its plants.

The MAP signals will be transmitted over the same broadband cable being installed for the network of Personal Computers, said Roger Zauel, Ford body and assembly systems manager.

Zauel also said the IBM PC terminals will eventually replace dedicated terminals and allow foremen and support personnel access to a variety of systems as well as to stand-alone microcomputer applications from a single terminal.

Ford and IBM actually signed the broadband network installation contract last December but announced it

last week as work began at the Wayne facility.

That prototype site project includes 60 PCs and is expected to be completed and in operation by July. Ford representatives would not speculate on the completion date of the entire project.

Most laborious part

The broadband cabling is already in place at Wayne and two other sites but will be "the most laborious part" of installation at the other sites, Zauel added.

Each IBM PC will be able to communicate with Ford's IBM mainframes in Detroit through IBM's Systems Network Architecture protocol as well as to emulate terminals for the minicomputers typically present at individual sites: the Digital Equipment Corp. VAX, Hewlett-Packard

Co. HP 3000 and IBM Series/1.

The PCs will contain IBM Network adapter cards for printer- and file-sharing capabilities through IBM's PC Network. Ford is also developing some stand-alone and shared applications for the PCs, Zauel said.

"What we're after is a universal terminal on the desk of the plant foreman," Zauel said. He said the existing terminals will be reassessed when their lease contract comes due in 1988.

Complement, not compete with, MAP

He emphasized that the PC project will complement, not compete with, Ford's MAP plans. Besides running over the same broadband cable, MAP file transfers will be controlled over the same PC terminals. The first MAP installation is due to be completed in 1987 at Ford's Woodhaven, Mich.,

stamp plant, which will also get PCs shortly.

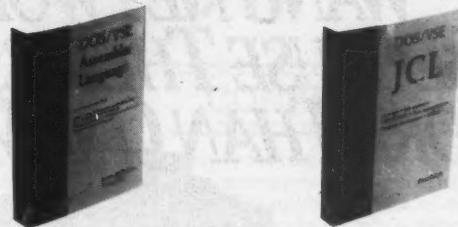
Sytek, Inc., the Mountain View, Calif.-based network manufacturer that supplies IBM with network boards used in the PC Network, views Ford's choice of the PC Network as a potential boost to the local-area network that many users thought would take a backseat to IBM's Token-Ring network.

"I think it helps set an attitude favorable to the use of broadband with the PC Network," said Sam Smith, branch manager of Sytek's Detroit offices.

Smith said Sytek will not be directly involved in this Ford project but has worked with other Ford broadband networks for manufacturing and office automation. He called Ford's network projects both extensive and effective.

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DV1/1

GSA to study site licensing policies for micros

By Mitch Betts

WASHINGTON, D.C. — The U.S. General Services Administration (GSA), which sets the policies on computer acquisitions by federal agencies, has launched an informal study to consider what agency policy should be toward site licensing for microcomputer software, GSA and industry officials said last week.

"The basic idea is to ascertain what approach the federal government should take when dealing with vendors in this area," said a GSA official who declined to be named. "At this stage, the government's whole position on site licensing is under review," the official said.

David B. Sturtevant, spokesman for the software industry's ADAPSO in Arlington, Va., said the GSA is expected to issue either mandatory regulations or nonbinding guidelines for federal agencies. He said ADAPSO will meet with the GSA this week to discuss the issues involved.

The federal government is a potentially large market for site licensing, since it has about 100,000 microcomputers, according to a 1985 survey by the U.S. Congress Office of Technology Assessment. For example, the International Trade Administration plans to obtain a site license for about 250 copies of Knowledgebase data base software from Micro Data Base Systems, Inc., of Lafayette, Ind.

Moreover, government agencies sometimes balk at buying copy-protected software, Sturtevant noted. The U.S. Air Force has reportedly refused to buy such software because the copy protection makes it difficult to use a hard disk and to create backup copies.

Site licenses typically give the user organization authority to make numerous copies of a master diskette for distribution at a user site.

NEWS

Tandem boosts Nonstop line

From page 1

tered at the extreme high end of the on-line transaction processing scale.

The Nonstop VLX, featuring processors based on very large-scale integration bipolar emitter-coupled logic/transistor-transistor logic gate-arrays circuit technology jointly developed with Motorola, Inc., delivers from 40 to more than 50 transactions per second in its smallest configuration, the company said. New circuit technology and an internal diagnostic subsystem also result in a 50% lower maintenance cost than is available with the existing Nonstop TXP.

One beta-site user, Bill Strange, manager of distributed communications support with Federal Express in Memphis, said his company has been operating a four-processor VLX for one month, mostly for batch processing, and has found it lives up to Tandem's claims. Strange could not comment on specific purchase plans but did say, "For the large-size systems that we need, it will certainly be a VLX."

Single VLX processor

A single VLX processor consists of two circuit boards, compared with four for the TXP, and incorporates a total of 31 gate arrays.

Four such CPUs, 32M bytes of main memory and 2.7G bytes of disk storage are required to form a basic VLX configuration, according to Gerald Peterson, vice-president of mar-

keting with Tandem.

From the entry-level configuration, the VLX can grow in four-processor increments to a maximum of 16 CPUs, 256M bytes of main memory and hundreds of gigabytes of disk storage inside the same cabinet. Because Tandem's architecture permits linear expansion, each four-processor increment increases throughput by another 40 to 50 transaction/sec., Peterson said.

One expert who said Tandem's VLX improves the company's competitive position with IBM was Omri Serlin, a consultant and researcher of the fault-tolerant market who heads Item International in Los Altos, Calif. The VLX, Serlin said last week, could compete with the 3090 "possibly in some cases" where transaction processing applications produce heavy I/O loads and have relatively low

CPU requirements.

Linking VLX cabinets

Users who wish to link up several VLX cabinets can do so by means of a Fox II fiber-optic controller, also introduced last week. The Fox controller also allows as many as 14 VLX units, each containing 16 CPUs, to be linked at distances up to four kilometers. Up to 255 geographically distributed VLX nodes can be linked through the vendor's existing expand networking software, Peterson said.

Serlin said the product "is a nice evolutionary system" for Tandem and incorporates technology that will be significant in future products. The performance boost over the TXP is substantial but not dramatic, Serlin said. "I wouldn't expect it to turn the entire industry on its ear," he said, but added that high profitability of the equipment may boost the company's financial performance when volume shipments begin.

David Wu, an analyst at Warburg Rowe & Pitman Akroyd, Inc. in San Francisco, said the price/performance of the VLX is "quite a significant improvement" over earlier Tandem models. "If you look at comparable systems — systems meaning systems, not CPUs — the cost of doing an automatic teller machine transaction per second on the VLX is about \$23,000; on the TXP it is about \$40,000."

Compatible with existing Tandem hardware and software, the VLX is integrated with Check, a diagnostic subsystem that uses expert system technology to automate many of the fault analysis tasks that would otherwise be performed manually. Through remote sensors and dedicated microprocessors, the Motorola 68000-based subsystem monitors the status of the VLX's processors, power supplies, fans and fiber optics.

Check also provides an optional dial-out capability that electronically reports urgent systems problems to Tandem's maintenance specialists by automatically calling the company's remote service centers, Peterson said.

The combination of an automated diagnostic subsystem and a threefold improvement in circuit reliability accounts for most of the VLX's maintenance-cost advantage over the TXP, he added.

Faster interprocessor bus

Compared with the TXP, the VLX provides a 65% faster interprocessor bus, rated at 40M byte/sec.

The bulk of the VLX's performance edge over the TXP stems from proprietary bipolar logic, which will form the "technological foundation" for Tandem's systems family for years to come, Peterson said.

Working with Motorola's semiconductor subsidiary, the supplier of on-line transaction processing systems developed a very large-scale integration 2,000-gate logic chip that gives the Nonstop VLX threefold-denser circuitry than Tandem's previous high-end system, the TXP.

The superior density reportedly contributes to the VLX's performance edge over the TXP by minimizing its number of components and interconnections.

Shipments of the Nonstop VLX, which costs slightly less than \$1 million in a basic configuration, are scheduled to begin during the current quarter.

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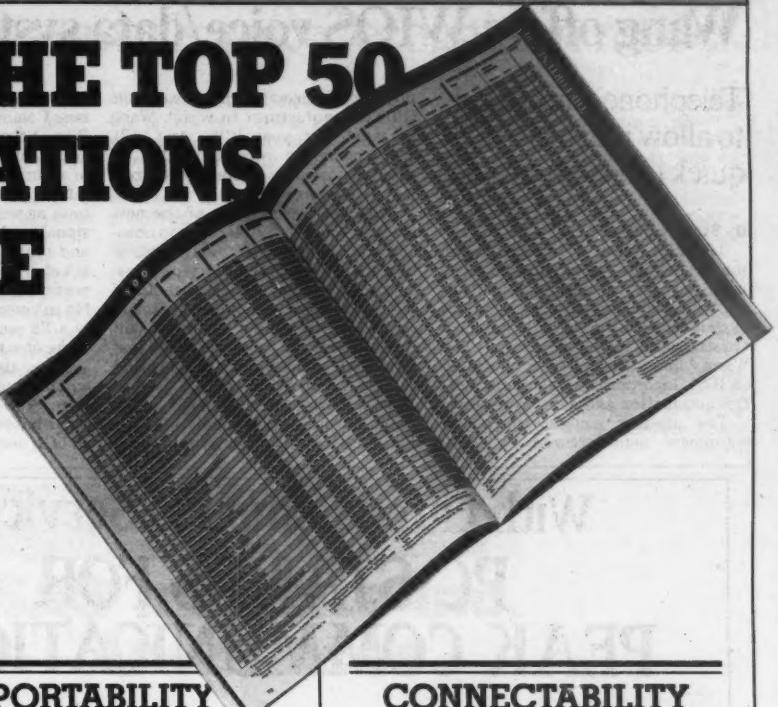
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Amarillo	March 4	Ft. Lauderdale	April 10	New York City	March 11, 19,	San Antonio	April 22
Atlanta	April 22	Ft. Worth	March 11		April 9, 22, May 14	San Diego	April 17
Austin	March 25, May 27	Halifax	March 19	Newport Beach	March 18, May 13	San Francisco	March 25, April 24
Boise	March 20	Houston	March 20, April 17, May 15	Oklahoma City	April 15	Seattle	April 3
Boston	March 11, April 15, May 13	Huntsville	May 8	Omaha	April 22	Sunnyvale	March 11, April 10, May 8
Chicago	March 13, April 16	Indianapolis	March 11	Orlando	April 9	Syracuse	May 8
Cincinnati	March 4	Iseilin, NJ	March 20, May 15	Ottawa	March 13, April 10, May 8	Toronto	March 4, April 8, May 6
Cleveland	April 2	Kansas City	May 6	Philadelphia	March 20	Tulsa	May 20
Columbia, SC	March 11	Lansing	March 11	Phoenix	March 27	Vancouver, BC	April 22
Columbus	March 5	Little Rock	May 13	Portland	March 4, May 6	Washington	March 5, 19,
Convent Station, NJ	April 7	Los Angeles	March 13, April 8, May 8	Quebec	June 18	Wichita	April 15
Dallas	April 1, May 6	Lubbock	April 8	Rochester	March 18	Winnipeg	April 17
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NEWS

Wang offers WIOS voice/data system over twisted-pair wire

Telephone wiring said to allow inexpensive, quick office expansion

By Stanley Gibson

LOWELL, Mass. — Wang Laboratories, Inc. last week expanded its networked office automation offerings by introducing a voice and data system operating over standard twisted-pair telephone wire. The Wang Integrated Office Solution (WIOS) incorporates telephony, office automation and data processing.

The product includes telephone equipment manufactured by Tele-

nova, Inc., a private branch exchange (PBX) manufacturer in which Wang invested last year [CW, Aug. 12]. Wang currently owns about 40% of Telenova, with an option to acquire a majority interest.

With the introduction of the new system, Wang is "not looking to obsolete coax or Wangnet," according to Richard J. Connaughton, vice-president of U.S. sales. A major benefit of WIOS is that because it uses common, unshielded telephone wiring, it will enable users to reorganize and expand their offices inexpensively and quickly, Connaughton said.

An important part of WIOS is the Wang Business Exchange (WBX), a digital PBX with voice and data capa-

bilities based on the Telenova 1 Business Communications System and the Wang VS minicomputer. According to Wang, the WBX allows the exchange of information among personal computers, terminals and computer systems as well as the exchange of voice signaling between office telephones and central office trunks. The product also allows switched access to VS ports; previously, it was only possible to connect a workstation directly to a VS port. The WBX may be used alone or with WIOS, Wang said.

Wang also introduced two new terminals that operate with WIOS, the Wang Station Set (WSS), a microcomputer-based telephone that includes an LCD and the Wang Modular Voice/

Data Terminal, consisting of a Wang 2110 asynchronous terminal and a WSS equipped with a data adaptor device. These terminals or a standard Touch-Tone telephone set can be used to gain access to the system.

Despite the fact that the terminals are connected to the VS computer by twisted-pair wire, which transmits at a rate of 19.2K bit/sec., response rate for word processing is 85% to 90% of the rate for standard direct-connect coaxial cable, according to Wang officials. This rate of performance is achieved by the addition of an "enhanced asynchronous device controller" between the Wang VS computer and the user, the Wang representatives said.

"The obvious positive side is that they are using twisted pair. In the long run, the end users in the office are going to want to be tied together with twisted pair," said Evelyn S. Wilk, senior manager at Arthur Andersen & Co. in Chicago. She said

"

'In the long run, the end users in the office are going to want to be tied together with twisted pair.'

— Evelyn S. Wilk
Arthur Andersen & Co.

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WIOS appears geared to small businesses and departments of 30 to 80 users who want the benefits of office automation without large initial outlays.

Wilks added that the move to twisted-pair wiring will probably not occur on a large scale until 1990, but "Wang needs to be in on it now so they can develop their own track record. The world is going to twisted pair, rather than heavy-duty cable, at least for the casual user." She also said, however, that the cable will have its place in many applications.

Lee Doyle, an industry analyst for International Data Corp. in Framingham, Mass., likened WIOS to Northern Telecom, Inc.'s Meridian system, introduced a year ago. "This falls into the same class as Meridian," he said, cautioning that immediate success may be difficult to attain. "You've got to sell the phone people and the DP people. I don't think people will be buying in the short term. It's tough to justify. Northern Telecom still must sell the concept," he said.

Initially, the product will be available only in 10 major U.S. markets, three of which are in California: Newport Beach, Century City and San Francisco; Boston, New York, Chicago, Dallas, Atlanta, Washington, D.C. and Cleveland.

Fifteen more U.S. cities will be added in July, and the product will be available in all U.S. markets in nine months, according to Connaughton.

Available immediately, a typical 48-telephone WIOS configuration for a small office, including 16 Wang Station Sets, eight Modular Voice/Data Terminals and the VS 5/WBX combination, costs approximately \$85,000.

AT&T Conversant Systems unveils voice recognition model

Scaled-down version serves 32 users at once

By Douglas Barney

BERKELEY HEIGHTS, N.J. — Less than a year after its introduction of Conversant I Model 80, AT&T Conversant Systems, a venture company formed by AT&T, last week introduced a second speech processing product.

The Conversant I Model 32 is a scaled-down version of AT&T Conversant's original product, which served 80 users simultaneously and was aimed at telephone companies and multiple-application service bureaus. The Model 32 serves 32 users simultaneously.

Like the Model 80, the Model 32 accepts input from a Touch-Tone telephone as well as voice input. With the system, users can validate credit cards, access computer data banks and receive automatic stock quota-

tions from the host computer. Because the system has its own hard-disk storage, it can operate without a host when large amounts of storage are not required.

"The system has built into it a computer [AT&T's PC 6300 Plus] that handles the transaction control and some local data base functions. It only needs to go to a host computer if you need to access large data bases," said Dean Hester, head of the Conversant Systems development department for AT&T Bell Laboratories.

Other possible uses include catalog sales, account inquiries and travel reservations, according to Kendra VanderMeulen, president of AT&T Conversant Systems.

The system can understand a variety of voices, accents and dialects without the user having to pause or enunciate carefully. The system's voice recognition and coding processes record information that can be played back through the computer.

Limited to 'yes' and 'no'

Unlike some large vocabulary systems provided by Votan of Fremont, Calif., and Kurzweil Applied Intelligence, Inc. of Waltham, Mass., the Model 32 has a vocabulary that is limited to the words "yes" and "no" and the numbers zero through nine. The system can, however, recognize up to 6,000 combinations of numbers. The user generally calls the computer

data bank and answers questions with a "yes," a "no" or a number.

Both Conversant products were based on technology previously developed by AT&T Bell Laboratories. The products, however, were formally developed and marketed by the Columbus, Ohio-based AT&T Conversant Systems.

The Model 80 costs between \$50,000 and \$100,000 depending on the configuration. The Model 32 costs between \$25,000 and \$50,000 and will be available through AT&T Information Systems or through AT&T value-added resellers. The product will be in beta test by July and widely distributed by September, Hester said.

IRS lacks proper disaster recovery plan, GAO claims

By Mitch Betts

WASHINGTON, D.C. — Fire, accidents, earthquakes or sabotage would cause prolonged disruptions at Internal Revenue Service computer centers because the IRS lacks an adequate disaster recovery plan, according to congressional auditors.

The latest report by the U.S. General Accounting Office (GAO) concluded that IRS contingency plans are incomplete and that the agency is making only slow progress toward a complete DP risk analysis.

The GAO audit said the IRS does not have backup processing sites, has not identified the critical DP work that must be performed first after a disruption and has security lapses such as unlocked doors to computer rooms after business hours.

In an official response, the IRS generally agreed with the GAO's findings and said it plans to improve contingency planning and to complete its risk analysis studies by 1987.

The GAO report added that a good contingency plan would have helped the IRS recover from the disastrous 1985 tax processing season because it would have identified alternative processing sites to cover the shortage of computer capacity at IRS centers.

The IRS disputed this notion, however, stating that contingency plans for natural disasters and sabotage are not applicable to last year's problems, which were associated with the implementation of new systems.

In a return volley, the GAO report stated that the 1985 problems — particularly inadequate computer capacity — were similar to what would happen if a natural disaster knocked out any IRS computers.

"If the IRS had had adequate contingency plans, the process of locating and using additional processing facilities might have been easier," the GAO said.

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Features of the Lattice C compiler for the 370 include:

- Generation of reentrant object code. Reentrancy allows many users to share the same code. Reentrancy is not an easy feature to achieve on the 370, especially if you use non-constant external variables, but we did it.
- Optimization of the generated code. We know the 370 instruction set and the various 370 operating environments. We have over 100 staff years of assembler language systems experience on our development teams.
- Generated code compatible in both 32-bit and 31-bit addressing modes. You can run compiled programs above the 16 megabyte line in MVS/XA.
- Generated code identical for OS and CMS operating systems. You can move modules between MVS and CMS without even recompiling.
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routines supported by Lattice (except operating system dependent routines), plus extensions for dealing with 370 operating environments directly.

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21APR86

Start-up firm grabs lead

From page 1

interface with microcomputers and laserwriters or accept microcomputer disks directly, with Postscript as the interface.

By the end of this year, with an installed base estimated at more than 150,000 laser printers and four million IBM Personal Computers and compatibles, corporate users will be ripe for desktop publishing, according to electronic publishing industry observer Jose Ramos of Redwood City, Calif. The result will be "like throwing a match into a room full of gasoline," Ramos adds.

Large corporate accounts were just a growing fraction of the \$117 million desktop publishing market, not including laser printer sales, last year, according to estimates by Ramos, publisher of "WYSIWYG" newsletter in Redwood City, Calif.

He predicts the corporate market will be a larger percentage of the \$240 million desktop publishing market he expects this year and will represent the majority of the market in 1987, when Ramos anticipates as much as 400% growth.

Challenges to Adobe

Adobe is not unchallenged in the page-composition communications market. Analysts expect a contest among Postscript, Xerox Corp.'s Interpress language and the Impress page description language from Imagen Corp. of Santa Clara, Calif., which also produces a document description language that

mixes text and graphics.

Imagen says its document description language is faster than Postscript and offers a binary format option, while Postscript communicates in ASCII characters. But Imagen does not rule out Postscript compatibility someday.

Apple opted for Adobe because of similar philosophies between the firms and a reluctance to go with what Apple saw as a direct competitor such as Xerox, said John Scull, Apple's desktop publishing marketing manager.

Postscript's attraction is its capacity to enable any application using a Postscript driver to communicate with any Postscript-speaking printer, instead of requiring a host of separate printer drivers to handle whatever printer the user might have.

To the user, communications are essentially transparent. Postscript's presence not only increases the options of output devices, it also enables an easy mix of text and graphics in a page layout.

The promise of Postscript technology so intrigued Apple that it bought a 20% share of Adobe as well as choosing Postscript for the Laserwriter. Despite Apple's major role in Adobe's development, the company's co-founders still retain control, and Adobe has actively pursued deals with other major hardware vendors that are potential Apple competitors.

Other companies licensing Postscript for use in their printer controllers include Wang Laboratories, Inc. and Digital Equipment Corp. among more than 20 others in 1985.

Postscript's appeal is not limited to major hardware

players. Smaller, local developers are exploring Postscript's potential as a complete programming language. Adobe sponsors classes in Postscript and has written two text manuals, *Postscript Language Reference Manual* and *Postscript Language Tutorial and Cookbook*, published by Addison-Wesley Publishing Co.

Sales have been hot at Computer Literacy Bookstore, Silicon Valley's high-tech-only book seller in Sunnyvale, Calif., says store co-owner Rachel Unkefer.

A big factor in the growth

"

Postscript's appeal is not limited to major hardware players. Smaller, local developers are exploring Postscript's potential as a complete programming language.

of corporate desktop publishing will be the appearance of page layout programs for IBM PC and compatible systems, which outnumber the Macintosh in corporations.

But such is Postscript's dominance that MS-DOS publishing systems are also including a Postscript driver. Aldus Corp. is building Postscript into its upcoming DOS version.

Even Ventura Software, which recently licensed Xerox Corp. to distribute its Ventura Publisher systems, plans to support both Postscript and Xerox's Interpress in the version due out in June, says John Meyer, Ventura Software president.

IBM's only desktop publishing activity has been at the high end of microcomputing. Its reduced instruction set computer-based RT PC, introduced early this year [CW, Jan. 27], was accompanied by the release of Workstation Publishing Software based on Interleaf, Inc.'s Technical Publishing Software.

The other significant hardware holdout is Hewlett-Packard, which uses its own Page Composition Language (PCL) on its LaserJet and LaserJet Plus. Unlike Postscript, PCL is not a programming language but an instruction set suited to text and capable of handling mixed graphics and text. Adobe representatives say Adobe and HP are negotiating for Postscript use, but HP is noncommittal.

"We do realize we need to integrate a page-description capability," says Cathy Lyons, independent third-party market development manager of HP's Boise, Idaho, divi-

sion. But she says HP may include page-description-like features in the next level of PCL.

Adobe expects Postscript soon to grow beyond the microcomputer arena and into high-end electronic publishing.

"We view Postscript as a page-description language that extends up through the graphics arts industry," says cofounder Geschke. Aiming for the high end of electronic publishing also means moving outside Apple's market.

"Apple is our biggest shipping customer, but I think [Adobe's] trend will be to rely less and less on Apple," Warnock says.

Options within desktop publishing and Postscript itself keep Adobe busy enough that it will likely remain a single-product firm for some time, company officials say. Adobe is constantly adding to Postscript's selection of typeface families, which now numbers about 50.

Beyond Apple's scope of activity, Adobe is developing techniques for reproducing half-tone, or screened, photographs, which are a series of dots currently limited by printer quality. The Laserwriter handles the equivalent of a 60-line screen; standard newspaper photographs are reproduced in 80- to 100-line screens.

Still, many professional typographers say current laser printer output with Postscript is only good enough for drafts, not the final product.

"The text is still a little fuzzy around the edges," says Tom Rohan, a printer worker with Interstate Press of Portland, Ore. "It's not typeset quality yet. But once laser printers can increase

the dots per inch, it will give typesetters some real competition." Compared with a typical laser printer output of 300 dot/in., typeset quality is considered a minimum of 1,000 dot/in.

Adobe points to two new Linotronic typesetters with Postscript that produce more than 2,000 dot/in. Linotronic's competition, Compugraphic Corp. typesetters, have adopted Interpress instead, keeping the race steady.

Micro users major players

Analysts say the largest part of the desktop publishing market consists of microcomputer users who are discovering their machines' publishing capabilities.

"Adobe has a tremendous lead, and barring a major aggressive push by Xerox [Interpress] and market changes in general, Postscript will become the de facto standard for the general business market," says Tim Bajarin, analyst with Creative Strategies of San Jose, Calif.

He does not dismiss Interpress, which tends to be faster than Postscript, but suspects Adobe will capture the microcomputer market while Xerox aims for the high end of electronic publishing.

Postscript's role is best played in the desktop systems, where its graphics are appreciated and speed is less an issue, says Jeff Tarter, editor of the newsletter "Softletter," published in Cambridge, Mass.

"Electronic publishing is the equivalent of mainframe work," Tarter says. "Daily newspapers or catalog publishers aren't going to be interested in all the fancy features of Postscript when they need speed instead."

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MSA users give high marks, few dollars, to Information Expert

Firm uses product as strategic tool

By Charles Babcock
and James Martin

LAS VEGAS — Users of Management Science America, Inc.'s (MSA) applications last week raved about the fourth-generation reporting feature introduced by the company last year. But that has apparently not translated into a big revenue source.

At Interact, the MSA users group meeting held last week, users offered good grades for MSA's Information Expert series, introduced last June. The series integrates MSA applications through a shared data dictionary and offers customers a fourth-generation reporting feature, Expert Reporter.

MSA claims Information Expert is in the hands of 2,000 customers, making it the "most widely used fourth-generation technology." In fact, the report writing component has been given to any MSA application customer who qualified for an update, and few have been inclined to buy the \$50,000 license that broadens the report writer's interface to go into internally developed or competing vendors' applications. MSA says the 125 licenses that they have sold are more than they anticipated in the first two years of the product, which they say took five years and \$20 million to develop.

Douglas MacIntyre, vice-president for sales, said that despite the heavy investment, MSA was willing to give the report writing segment away as a "strategic product."

When the Reporter's data dictionary is added as a front end to an MSA application, a user may access any standard IBM file and data base management system as well as independents' products, such as Datacom/DB from Applied Data Research, Inc. and IDMS from Cullinet Software, Inc. At the same time, data can be retrieved through the report writing interface from other MSA applications and, with the purchase of a \$50,000 permit, from competing vendors' applications.

'Playing with the same deck'

Information Expert "is superior to any report writing system on the market. It's nice to have everyone playing with the same deck," said George E. Folger Jr., manager of systems development for Jeppesen Sanderson, Inc. in Englewood, Colo.

"I would say Information Expert is a product that opens up a lot of doors for MSA," said Ronald J. Beck, vice-president of the Bank of New York and president of the Interact group.

"MSA has put a lot of pressure on other software vendors at this point," agreed Richard L. Lippincott, assistant manager, systems and programming, for Geisinger System Services, a health care firm in Danville, Pa.

Once customers get accustomed to the capabilities of the report writer, they will be more inclined to buy more MSA applications that can be accessed by it, MacIntyre said. In addition, they may be inclined to buy the Expert Language segment or the screen painting facility once the latter is available in November, he said.

Some users were skeptical that the "expert system components" of Information Expert would live up to a standard definition of expert systems. But even users who had stumbled over shortcomings of the system had praise for it.

Ronald Kaput, manager of systems and programming at CF Industries, Inc. in Long Grove, Ill., said his development staff experienced disastrous misuses when they attempted to use Expert Reporter to create on-line reports from diverse applications. The relational-type pointers would malfunction, and "all of a sudden we would wind up in the middle of an old report. It would bring my production system down cold." Kaput nevertheless

described Expert Reporter as a "fantastic product."

MSA Executive Vice-President Dennis V. Vohs said the misuse could occur if users attempted to get the Expert Reporter to do things limited to the custom-reporting features of the Expert Language. When Kaput cited his experience at a conference session, however, MSA told him that the malfunction occurred because of a "logic error" that was being corrected in the next release.

Users at the meeting said they will keep buying MSA applications even though MSA offers no data base management system as an umbrella for its products as does Cullinet Software. But that commitment was con-

tingent on MSA's continued willingness to interface its applications with multiple data bases.

"I think Cullinet Software is winning sales on the basis of claims that its applications run best with its data base," noted Mason Davis, of Zachman Davis Computer Services, Inc., Atlanta, a firm that serves MSA application users. But MSA's ability to interface its applications to varied data bases makes it "a matter of which pitch you believe," Davis said.

Also viewed as a big plus was MSA's willingness to convert its applications to run under IBM's relational data base management system, DB2, a step Cullinet has said it does not intend to take.



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VIEWPOINT

EDITORIAL

Time out on the level playing field

The most recent scrimmage of the post-divestiture level-playing-field competition has seen a key player, Pacific Bell, seem to abandon its team and go over to the other side. Pacific Bell last week enlisted with IBM and Tymnet/ McDonnell Douglas Network Systems Co. to help the Federal Communications Commission out of the dilemma of finding a way to permit the divested Bell operating companies to offer enhanced services (protocol conversion and voice mail, for example) without allowing their monopoly on local service to essentially close out all competition — a concept the FCC has labeled Comparably Efficient Interconnection or CEI.

The Pacific Bell/IBM/Tymnet solution: Make the divested Bell operating companies (including Pacific Bell) promise that, when enhanced services are offered, their competitors will be able to take advantage of the same price breaks and interconnection efficiencies offered to their customers.

Now, why would one operating company, Pacific Bell, suddenly propose an FCC ruling that would provide a marked leg up to its potential competitors? Perhaps Pacific Bell figures that it can never gain the upper hand over enhanced-service vendors like Tymnet and that it will gain more customers in the long run by acting as transport to such providers. Or it may believe it is simply bowing to the inevitable by supporting some form of CEI.

Whatever the reasons (and Pacific Bell officials are mum on the subject), it's a fair bet that the FCC, Tymnet and other enhanced-service providers will applaud the move as a wonderfully generous gesture of fair play — to which users should say, "Time out!"

The whole design behind divestiture was to make the communications market more competitive, creating better services, increased options and a few price breaks for consumers. If now the Bell operating companies are compelled to adjust the costs of interconnecting their customers with those of competitive services every time the operating companies find a way to *lower* their own costs, where is the incentive for cost control? And, where are the price breaks for users?

The Pacific Bell/IBM/Tymnet proposal would also allow the Bell operating companies to add value (such as packetizing and protocol conversion) *only* to services offered to users within their own regions, not to the connections they provide between those users and long-distance service providers like Tymnet — who, of course, prefer to do the enhancement themselves. This simply encourages companies to bypass their local telephone company and build their own dedicated bypass connections to long-distance carriers. And, in the long run, users are again deprived of the potential price breaks, flexible rates and services the Bell operating companies might offer local customers.

Granted, so strange and wonderful is the sight of vendor cooperation in the fractured, fractious communications industry that one feels almost obliged initially to look favorably upon the Pacific Bell/IBM/Tymnet action. But closer inspection discloses yet another attempt to undermine the free and open competition mandated by the 1984 Consent Decree, competition that will in the long run benefit users far more than will ill-conceived restrictions on the regionals.



LETTERS TO THE EDITOR

Setting Software AG's line straight

Two letters to the editor, "Software AG chairman has pie-in-sky hopes for Adabas, Natural products" [CW, March 17], show ignorance about Software AG of North America, Inc.'s Adabas and Natural.

The first letter's statement that "Adabas is an excellent network data base management system" shows that the writer either does not know what a network DBMS is or knows little about Adabas. I do not recall Software AG referring to Adabas as a "relational data base" but as a "relational-like DBMS."

Like Oracle Corp.'s Oracle, Adabas requires an index structure to be able to retrieve data from the flat files. Adabas must be included in the list of next-generation data base management systems if IBM's DB2 and Oracle are included.

As far as the second letter's challenge that Software AG's Natural is not a Cobol replacement, Natural is the primary programming language of hundreds of Adabas/Natural installations.

Natural is a very powerful fourth-generation-language solution to reduce development time.

Leo Webb

Data base administrator
Smitty's Super Valu, Inc.
Phoenix

Chip industry is best governed least

I applaud your editorial, "War of the chips: Vendors vs. users" [CW, March 24], opposing U.S. government intervention in the international semiconductor market.

It would certainly be a shame to see our dynamic semiconductor industry become as stagnant and out of date as our other industries that have received government protection from competition: steel, ship building, textiles, shoes and autos, for example.

And, as you say, government can best help business by doing less. Lower government spending will reduce interest rates, which will stimulate business investment.

Another stimulus for investment would be to change our tax code so that dividends are not taxed twice and so that capital gains are taxed only if they are not due to inflation.

J.D. Gay Prewitt
Lexington, Ky.

System/38 deserves recognition

I am frequently astonished at the absence of any mention of the IBM System/38 in the trade press but usually attribute it to a lack of expertise on the part of the journalist in categorizing this innovative computer. (A friend recently joked that the biggest problem with the System/38 is that it is not IBM compatible.) When an article entitled "Mini DBMS market growing" [CW, March 31] and its associated product chart completely ignore what I and many of my associates consider the best all-around DBMS and general business computer system in the world, I must take exception.

This incredible system has been around for over six years, more than enough time for the prophets of the leading edge to recognize a good thing. Having endured over a decade of babysitting IBM mainframes mired in a dozen levels of software with roots closely tied to their 360 parents, it was almost a catharsis for me when I had the opportunity to begin working as an analyst/programmer on the System/38.

The tools that this system provides to the system developer are without equal in the business, and the user-friendly, single level of operating software that is the first offering from IBM to be developed for a truly interactive (not batch) environment provides the data processor with the freedom to try new, more effective approaches to solving the information needs of his company. Staffing requirements, as well as hardware and software costs, are reduced to a level that put this system within reach of even a modest-size organization. And finally, the data base management system that is an integral part of the operating system has as much right to call itself relational as any other on the market.

My hyperbole will no doubt surprise those who have not had the pleasure of working on this amazing machine, but the fortunate System/38 veterans out there will certainly understand. What is not understandable, though, is the reticence on the part of the data processing establishment to give this innovative system its deserved recognition. With IBM constantly expanding the high end of the System/38 line, maybe some day it will take up enough computer room floor space and require enough system programmers to be recognized as a legitimate IBM computer system.

Donnie W. Collins
Agrico Mining Co.
Lakeland, Fla.

VIEWPOINT

When management calls a tune professionals won't play

By HOWARD KARTEN

Some of the testimony before the space shuttle *Challenger* inquiry board puts a spotlight on an old conflict that's especially pertinent to the DP community: the tension between employees such as programmers, who have technical skills, and the goals and methods of the management who employ technical experts. In today's fiercely competitive business environment, it is appropriate to ask, What are the responsibilities or obligations of professionals when management pays for their skills (which, presumably, includes their judgment) but ignores advice that runs counter to management's goals and timetables?

Here are three real-life cases illustrating some of the serious ethical conflicts that can face DP personnel:

- Systems programmer Harold worked in a shop running an on-line financial system. At 10 a.m. one morning, he discovered that a freak error had changed one byte in the on-line system. The program was running at that time and would remain in operation until 8 p.m. that evening.

He presented management with two options for correcting the error. The "approved," somewhat lengthy way was to reassemble the faulty program module, re-link the program, put it back in the library, halt the version of the on-line program and restart the corrected program. It would have taken at least four hours to accomplish this, and during that time there was considerable risk of scrambling critical files.

The quick-and-dirty solution — the one that would probably be prohibited by a canon of professional conduct — would be to halt the system for 20 seconds, insert the correct code into memory manually (through the console), start the system up again and make the change properly at night. Choice No. 2 gets the program corrected sooner but, because it leaves no audit trail, is almost a textbook formula for what's delicately called "financial irregularity." Harold had fully absorbed the culture and values of his department, which emphasized a high degree of integrity and "approved fiduciary behavior" when dealing with money, so he faced a serious ethical dilemma.

- Jim, a civilian programmer employed by the U.S. Department of Defense, was told that his program analyzing and presenting data from a weapons system test should be written in a particular way. Jim, wise in the political ways of bureaucracies, strongly suspected that the reason was to allow some mild cooking of the data. He also was aware of the fates of others who had bucked management and how meager were the

protections afforded by civil service.

- Sam, a programmer for a retail chain, was told to write a program so that if an account had a credit balance but no activity during the past month, no statement would be sent to the customer. Sam felt this was not entirely fair to customers.

Part of the ethical problem comes from the fact that the three programmers were on the employer's payroll. If you're on a payroll, it can take an

enormous amount of courage to stand up and say, "Hold it" to ac-

tions that you believe might violate your responsibilities as a professional. Clearly, dissenting in such a case can put your job at risk. In the three cases above the programmers acceded to management's wishes.

If Jim, Sam and Harold had not been on a payroll but instead had been on retainer (that is, employed by a third party), they might have had greater freedom of action and influence with management. For example, if they felt strongly enough that management's wishes conflicted with their obligations as professionals, one option would be to ask to be removed from the account.

Under the Piper's Pay Principle (he who pays the piper calls the tune), any employer is justified in saying, "You've explained my options and probable outcomes, and I've told you what I want. It's not illegal, so stifle and do it my way or get off my payroll." In general, professional pipers are obligated to follow client instructions. Two exceptions are if the client requests something clearly illegal or if the professional feels that he would not be able to work wholeheartedly due to strong feelings that the client's proposed course of action would be ineffective, destructive or injurious to the client.

Our industry has seen periodic calls for professional status for DP personnel, which is probably a noble goal. But because most depend on one employer for their income, the idea of professional status is probably a pipe dream at best. Management more often seeks team players than professionals who value indepen-

dence. The entire issue of ethics and professional status for on-payroll experts is complex and deserves additional discussion by the entire DP community. One answer is undoubtedly for DP professionals to add persuasion abilities to their other technical skills so that when management asks for an opinion, they can provide it with greater credibility. Perhaps we would see less vaporware, for example, if DP personnel could achieve greater influence with management. Who knows what this might do to lower the burnout and bankruptcy rates in the industry, to name just two areas?

In the meantime, it's instructive to ponder some provocative words on the subject written more than 80 years ago by playwright George Bernard Shaw: "All professions are a fraud upon the laity."

Diagnosis: Epidemic overspending in IBM shops

No easy cure for getting more out of mainframes

By EFREM G. MALLACH

Will Zachman of industry watcher International Data Corp. recently estimated that "IBM customers spend \$3.5 billion to \$4 billion per year more than they have to on IBM mainframes." By any standard short of the national debt, this is a substantial amount of money.

To understand this number we must place it in perspective. Total user spending on

IBM mainframes is about \$15 billion per year. If Zachman's figure is correct, the typical IBM mainframe user organization is spending about 30% to 35% more on these systems than it has to. This figure is an average of several different user categories:

- Users who are doing perfectly. Potential savings: zero. Cost to obtain these savings: none.

- Users who should save by tuning their system. Potential savings: about 5%. Cost: \$10,000 to \$50,000.

- Users who should save by using plug-compatible equipment. Potential savings: 5% to 10%. Cost: administrative effort, switch-over time plus possible emotional difficulties from leaving the comfort of the Big Blue security blanket.

- Users who should save via converting to another mainframe architecture. Potential savings: 20% if the workload is atypical and a different hardware-software combination fits it better; otherwise the same 5% to 10% as with plug-compatible manufacturers (PCMs). Cost: all those above, plus a large software conversion task.

- Users who should save by converting to superminis. Potential savings: 30% to 50% through the IBM 3083 level but less for larger IBM systems because they must be replaced by multiple systems, networks, clusters or similar. Cost: same as above. The extra ongoing effort to deal with system software that does not offer all the functionality of mainframe products will be offset by generally simpler system procedures, user interfaces, utilities and the like.

- Users who should save via converting to multiple superminis. Potential savings: 50% to 75%. Cost: enormous because the basic tools for serious large-scale work are not

there. (A few recent products, such as the Enmasse Computer Corp. system, are changing this picture.)

The moral here, unfortunately, is that there's no free lunch.

The easy moves don't get you nearly 30%. That doesn't mean you should stay put: 5% or 10% of a few million is still worth shooting for. Managers in most areas other than computing would give their eyeteeth for 5%.

The 30%+ moves, on the other hand, aren't easy or cheap. The average 3083 staff can't build and install a network of multiuser micros any more than it can sprout wings and fly. Even the supermini route would

be traumatic. The current staff would see all their hard-won CICS and JCL skills becoming useless. If everyone went to minicomputers, there wouldn't be enough VAX, Eclipse or DPS 6 programmers to go around.

It follows that IBM will have

most of its multibillion-dollar bonanza around for a while because \$4 billion is less than it would cost users to save \$4 billion.

As technology keeps PCMs, minis and micros moving ahead, IBM's prices will stay just close enough to keep users from switching to these alternatives in volume. This strategy has worked for a long time. Today's micros change the specifics but not the principle.

Fortunately, Mr. or Ms. DP Manager, you are not helpless. You are not a captive. You have options. It just takes a little forward planning to make the short-run constraints go away. You should take these actions:

- Keep apprised of industry trends and your options. Your mainframe vendor's sales representative may or may not be helpful, depending on what other products the firm offers.

- Look for ways to try alternatives. New applications, new corporate divisions and the like are all possible opportunities to apply new, cost-effective technologies. Your mainframe vendor has a vested interest in your continuing to do things the way you have always done them. This may not be in your best interest.

- Develop a plan for where you want your installation to be in five years. Major changes, changes that may be too big to contemplate if they are seen for the first time at close range, are easier to justify and implement as part of a long-range plan.

- Above all, remember who's in charge. You are, not your vendor's sales representative. It is your responsibility, not your mainframe vendor's, to provide your employer with cost-effective information services. If you are calmly paying Zachman's 30% premium with no plans to do anything about it, you are not fulfilling this responsibility.

Now a writer and consultant, Kartan has been involved with computers for two decades as a programmer, systems analyst and DP manager.

Mallach is associate professor of computer science at the Boston College School of Management and a consultant to top managers of vendor and user organizations.

VIEWPOINT

TURNAROUND
TIME

Larry Long

Q I'm a systems programmer in the area of systems performance and tuning. I have decided that my talents could be better used elsewhere. My problem is finding an organization that is looking for someone

with my qualifications. I'm receiving newspapers from cities I'd like to live in, but it seems that large organizations looking for systems people do not place ads in the paper.

I've also tried finding a new opportunity through headhunters but have been unsuccessful.

Is there any way for people that don't write Cobol or Basic for a living to further their careers?

Placement agencies pro-

vide a valuable service, but they are certainly not the only solution. If your systems programming experience is with state-of-the-art hardware and software, you should be able to work anywhere you want. Companies everywhere, especially large companies, are forever looking for qualified systems programmers. Select the area or areas of the country in which you wish to live, and then select particular cities. Write to each city's Chamber of Com-

merce and request a membership list.

If you are adamant about limiting your search to large companies, pick only those companies with 700 or more employees. Be advised, though, that smaller companies need good systems programmers also. Some small organizations are far more sophisticated in their application of computer technology than some Fortune 500 companies.

Call the personnel depart-

ments of those companies that interest you and ask to speak with someone who deals specifically with employment in computer-related areas.

Request the appropriate paperwork and correspond directly with this individual. "Dear Sir" letters get considerably less attention than those addressed to a particular individual.

Another way to get attention is to place a notice in the "position wanted" section of the classified ads. The "desperate" stigma long associated with this section no longer applies. Many career-oriented people in the computer fields find the "position wanted" section a convenient and anonymous way to advertise their desire for alternative employment.

Q The computer revolution is grinding to a halt in our company. Three years ago our data processing division was favored with the highest budget increase. Management seemed to be satisfied with what we did with the money, but yesterday I was asked to cut my budget for next year. Other department managers were told to expect modest increases.

User demands for our services are greater than ever. The proposed budget will force us to eliminate certain existing services at a time when we should be expanding.

Do you have any arguments that might convince management to reconsider its request?

The budgetary process is a series of negotiations that ultimately yields the optimum allocation of funds for the good of the company.

All you can do at this point is present a well-defined case for getting the level of funding necessary to service the data processing and information needs of your company. Identify in writing those services that will be adversely affected by the cut. If your case is rejected and you haven't already done so, implement a chargeback system.

Any company that is large enough to have department managers should have some kind of chargeback system for computer service. A good chargeback system will result in more efficient use of computing resources and a more realistic allocation of funds.

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Long, president of Long and Associates, is a consultant, lecturer and author in the field of information services. If you have a question you'd like him to address, send it to Larry Long, Editorial Department, Computerworld, P.O. Box 9171, Framingham, Mass. 01701-9171.

SYSTEMS & PERIPHERALS



HARD TALK

Charles F. Bender

The revolution in processing

A revolution is in the works. Since the beginning of machine computation, traditional computers have been based on von Neumann architectures and scalar processing.

Now, machines have been developed that offer users the option of vector or parallel processing methods. Vector processors are particularly useful in a computationally intensive environment. They are a standard feature in most of the supercomputers on the market today.

The future impact of vector processing can be more clearly evaluated if one considers the recent entry of IBM into the vector processing market with its 3090.

Parallel processors are in a more experimental stage, but they show even more promise for the future. While vector processors are ideal for number crunching, parallel processors seem to be ideal for symbolic, noncomputational problems like natural language processing.

Vector and parallel processing, added to the traditional scalar approach to computing, open the door to a new generation of mainframes.

In the past, many an interesting computational problem had to be restricted, modified or dissected to make it fit the computer. A variety of complex algorithms were created to permit the computer to solve computationally intensive problems in ways that are instinctively unnatural. One example is algorithms that are constructed for extracting the lowest eigenvalue of matrices that cannot be accommodated in memory.

Today, a new generation of computers offers the option of taking a more

See REVOLUTION page 23

Bender is director of the Advanced Computational Methods Center at the University of Georgia in Athens, Ga.

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Shearson adopts IBM 3295

Plasma terminal accesses four information services

By Alan Alper

NEW YORK — When Shearson Lehman Brothers, Inc. sought last fall to provide its over-the-counter (OTC) traders with the ability to display simultaneously data from disparate financial information services on a single workstation, there appeared to be few alternatives.

It was painfully obvious to Shearson officials that there was not enough room on each trader's desk to accommodate the four terminals required to access financial information services, an IBM Personal Computer or IBM 3270-type terminal to interact with the corporate mainframe and the oversize telephone needed in the fast-paced world of stock trading.

No product seemed to allow access from a single workstation to the four financial information services to which Shearson subscribes, including Quotron Systems, Inc.'s Quotron. Shearson therefore needed to modify existing technology to develop its own workstation.

Making matters more difficult, the firm wanted the workstation developed before its OTC traders moved in February from the World Trade Center to the new corporate headquarters of its parent company, American Express Co.

"We felt it was important to give the traders the most sophisticated tools possible to do their jobs," recalls Ed Miller, an assistant vice-president at Shearson. "We also knew we had a small amount of time to work with."

Shearson considered a network of IBM 3270/Personal Computer XT's to access the

See SHEARSON page 24

NEW THIS WEEK

- Term Tronics offers its M-179 color display terminal

- For more on this and other new products, see pp. 87-108.

INSTANT ANALYSIS

"When IBM decided which systems would live and which would die, one of the first criteria was the installed base, and the 8100 and the System/38 clearly fell short in that area."

— International Data Corp. analyst Frank Gens on IBM's announcement that the 8100 would receive no future hardware enhancements

Sperry introduces disk subsystem

By James Connolly

BLUE BELL, Pa. — Adding its second thin-film disk subsystem for mainframe-class systems in six weeks, Sperry Corp. last week introduced a 5.5G-byte magnetic disk system with cache and solid-state disk capabilities.

The Model 5090/8490 subsystem, manufactured for Sperry by Amperif, was preceded in March by the Sperry 5057/8481, which company officials noted provides less disk capacity but a higher performance cache.

Sperry officials said a single 5090/8490 cabinet occupies only 12.1 sq ft of floor space while holding up to 5.5G bytes of formatted disk storage, dual controllers, 32M bytes of cache memory and 40M bytes of solid-state storage. Another 5.5G bytes of disk storage can be added in a 6½ sq-ft expansion cabinet.

A 5G-byte 5090/8490, available in June, costs \$296,500 or can be leased for five years at \$8,236 per month. The same subsystem with 8M bytes of cache costs \$366,500.

Laser lab glows over new Cyber/180 990

By James Connolly

MINNEAPOLIS — With one system installed already, Control Data Corp. plans to begin soon volume shipments of its Cyber/180 990, the high-end product in the 2-year-old Cyber/180 family.

Company officials say they expect to ship 50 990s, with performance ratings of 42 million instructions per second with vector utilization for a uniprocessor and 63 MIPS for a dual processor.

While the user of the first installed 990 declined to discuss the system, another early customer reports that the CDC sys-

tem bests other mainframe systems in benchmarks with near-supercomputer performance. That customer, with a 990 delivery scheduled for July, is the Laboratory Laser Energetics at the University of Rochester in Rochester, N.Y.

"It was the best machine for our scientific purposes. Not only have we had a long-standing relationship with Control Data, but we had benchmarks in a competitive-bid situation involving about seven vendors. In terms of cost-effectiveness and in terms of speed, the 990 was the best for

See CYBER page 23

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Transact Departmental Cost Report For June 1985					
Dept:	Total Units	Total Costs	Unadjusted Units	Unadjusted Costs	Unit Costs
Units in process at beginning of month					
SOG completed in previous month					
Units placed in production during month					
Start Date					
Direct Labor					
Factory overhead					
Total direct labor and costs	4,400	93,725			
Unit cost of work done during month					
Output:					
Units in process at end of month					
SOG completed in current month					
Units completed and transferred to					
Shipping Dept.					
Total output - units and costs	4,400	93,725			



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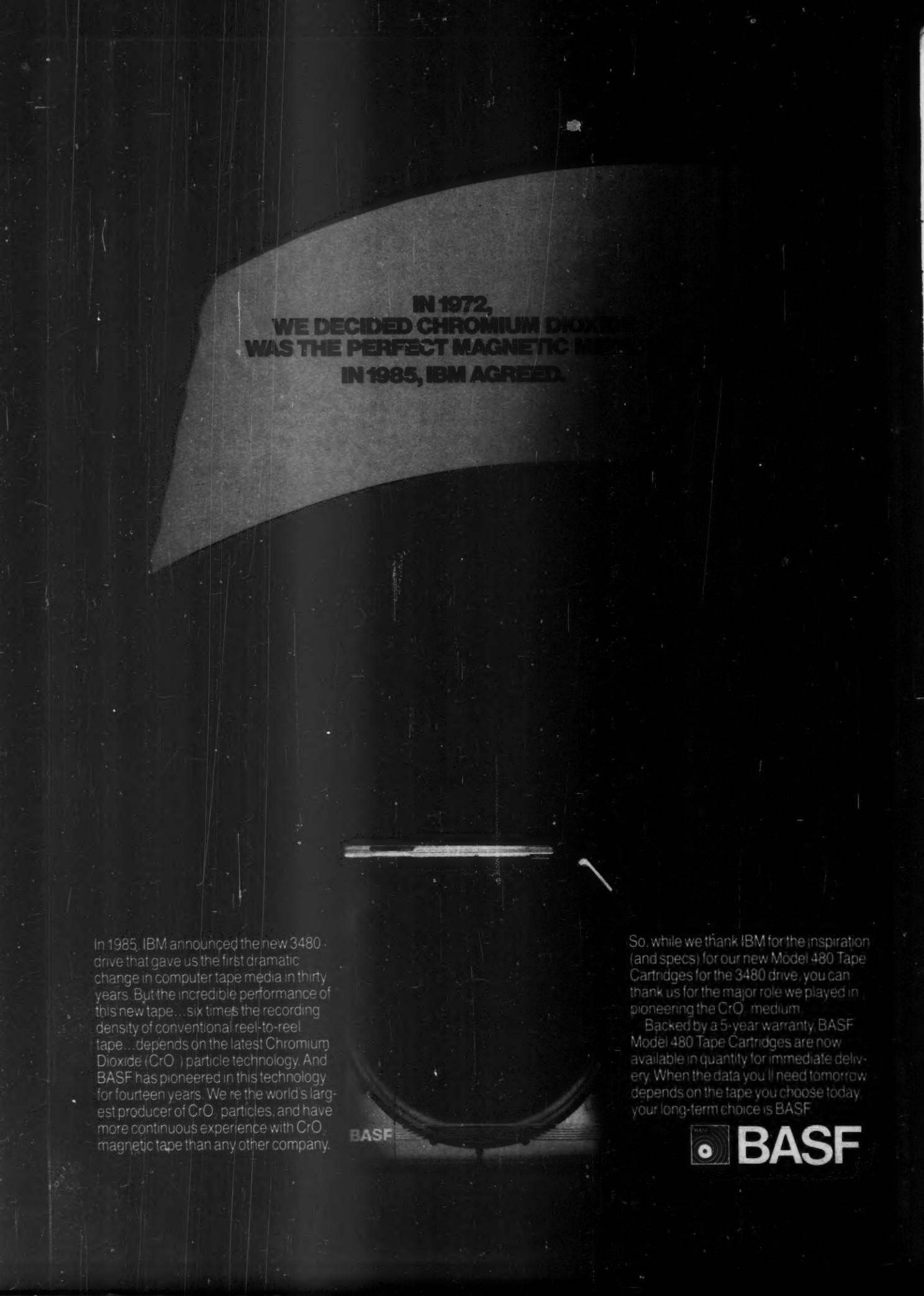
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SYSTEMS & PERIPHERALS

Revolution in processing

From page 19

natural approach to programming. Some problems lend themselves to scalar processing, while others, such as all matrix-expressible problems and most signal processing problems, fall into the province of vector processing.

Still other problems, including many artificial intelligence searching problems and numerical problems like simulations, are best approached through the use of parallel processors. Some problems contain elements of all three processing modes. A notable example is image analysis, which involves the components of feature extraction, enhancement and signal processing.

Around the world, researchers in computer technology have reached the conclusion that very little is to be gained from further manipulation of scalar processes-

ing. New languages and new computation approaches are being developed in dozens of laboratories, and they are being developed for a new generation of computers.

Beyond the fact that vector and parallel processors offer a variety of computational approaches, the inevitable increase in computation speed deserves consideration.

Today, an off-the-shelf Control Data Corp. Cyber 205 supercomputer can handle a matrix of 180 by 180 vectors with an inversion time of 0.46 seconds and a multiply time of 0.16 seconds, which is about 800 times the speed of a Digital Equipment Corp. VAX-11/780. A system with four or more CDC Cyberplus processors is theoretically even faster, but extensive algorithm and software optimization is required before that system approaches its theoretical maximum.

The sum effect of increased computational speeds and alternative approaches to processing, both available today, is that

a mathematician, scientist or engineer who uses advanced computer systems has a new degree of computational freedom. The restrictions of the past do not necessarily apply. Problems that require a supercomputer today will be solved on a typical mainframe computer tomorrow.

The implications of this mainframe revolution must be met head on. We at the Advanced Computational Methods Center have taken the first steps. We offer supercomputer training workshops to users who would like to learn more about vector or parallel processing. But one educational program at one university is not enough to prevent the potential dislocation of a whole generation of programmers.

This time, computers are not only growing smaller, faster and less expensive, they are changing in more fundamental ways. And as the machines change, a generation of machine and programming languages is evolving. Whether we are prepared or unprepared, the future is upon us.

ing a uniprocessor 990. McCrory declines to say how much the laboratory is paying. However, CDC officials say a typical system costs about \$5 million.

The 990 is replacing a Cyber/175 but also will reduce the laboratory's reliance on time-sharing arrangements with the John von Neumann Center, which operates a Cyber 205 in Princeton, N.J., and with Boeing Corp., which operates an X-MP.

He notes that researchers now use a Digital Equipment Corp. VAX 750 to access the von Neumann Center and Boeing systems but that a selling point for the 990 was the fact that it will not require a front-end processor.

Use of 990

He says the 990 will be used for programs requiring 100 to 150 hours of processor time and that larger jobs still will be moved to the von Neumann Center for processing on the Cyber 205 and on the ETA-10, which the center expects in 1987.

McCrory also reports that CDC's continuing financial problems were a consideration in the 990 acquisition.

"I would be lying to say that they were not. Any time you see severe market oscillation in any large company, it causes concern. All I can tell you is that I believe they are going to be in the computer business for some time to come. Their real strength, ever since William Norris founded the company, has been to address the scientific and engineering computer market. From what I can tell, they have been moving strategically to protect that important part of their base," Norris says.

Cyber has lab glowing

From page 19

our uses," says Robert L. McCrory, director of the Laboratory for Laser Energetics. That laboratory, operating under a grant from the U.S. Department of Energy, will use the 990 for two-dimensional simulations of the laser implosion phenomena.

McCrory notes that his laboratory could not afford a true supercomputer such as a Cray Research, Inc. X-MP or an ETA Systems, Inc. ETA-10. But he says of the CDC system, "An important thing is the operating system, called NOS/VE, which has been developed by Control Data so we can have access to the full two million words of memory. At least two million words are required for our applications. The IBM 3090, for example, was benchmarked in the same environment and for our applications just cannot compare with the performance of the 990. The Cray 1S, which is an older machine, certainly can do our job, but that is an older technology and is not the state of the art."

He adds, "The 990 is an affordable near-supercomputer, and I think it fills a place in the market that has been missing. Very few establishments like the government labs and the large oil companies can afford to buy the state-of-the-art supercomputer such as the Cray 2. Yet if you backed off of that, there was not a machine on the market that was not something better than just an enhanced VAX."

The laboratory is acquir-

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Shearson adopts IBM's 3295

From page 19

various financial information services and the corporation's own mainframes and to display the data on windows. But the windows on the 3270-PC/XT would have overlapped, and with less than five months until the traders were to occupy their new offices, Shearson lacked the time to design and install a network, Miller says.

Another option consisted of using a Personal Computer AT with IBM's much-touted but seldom-used model 3295 plasma terminal. Each AT would function as a gateway to the financial information services. The

advantage of using the 3295 was that traders could open four independently controllable windows on a 19-in. flat-panel display.

Shearson opted for this approach because it not only saved desk space but offered the only feasible way to display the voluminous data each trader requires to make buy-or-sell decisions, Miller explains. It would enable traders to look at up to 60 stock listings via Quotron, which previously could have been accomplished only on a Quotron terminal.

The real payoff

Noting that the 3295 is 10 times more expensive than typical CRTs, Miller says cost was not the primary concern. "The real payoff comes with trader productivity rather than in equipment replacement," he suggests.

Shearson contracted with Programit, a New York software consultancy, to design the workstation. The firm was chosen because it had developed a multitasking version of Microsoft Corp. MS-DOS, called Taskmaster, which Miller says provided the horsepower to monitor the various information services simultaneously.

Currently, the workstation can capture and display data provided by Instinet Corp.'s Instinet trading system and Bridge Data Co.'s Bridge Data system, which tracks trading trends. Access to the National Association of Securities Dealers Automated Quotations (NASDAQ). Level III and Quotron stock quote services is undergoing final tests and will be added to the workstation next month, Miller says. Consideration is also being given to adding a fifth service, Autex, Inc.'s real-time block trading network, he adds.

Four-port board

Since some financial services such as NASDAQ provide add-in boards to enable PCs to emulate native terminals, a four-port board was installed in each AT console. Each AT has been fitted with a 1M-byte memory board for local processing in the event a trader wants to run Lotus Development Corp. Lotus 1-2-3 or Ashton-Tate Database II, Miller says. The AT's 30M-byte disk drives store data extracted from the firm's IBM 3080 and 3090 mainframes.

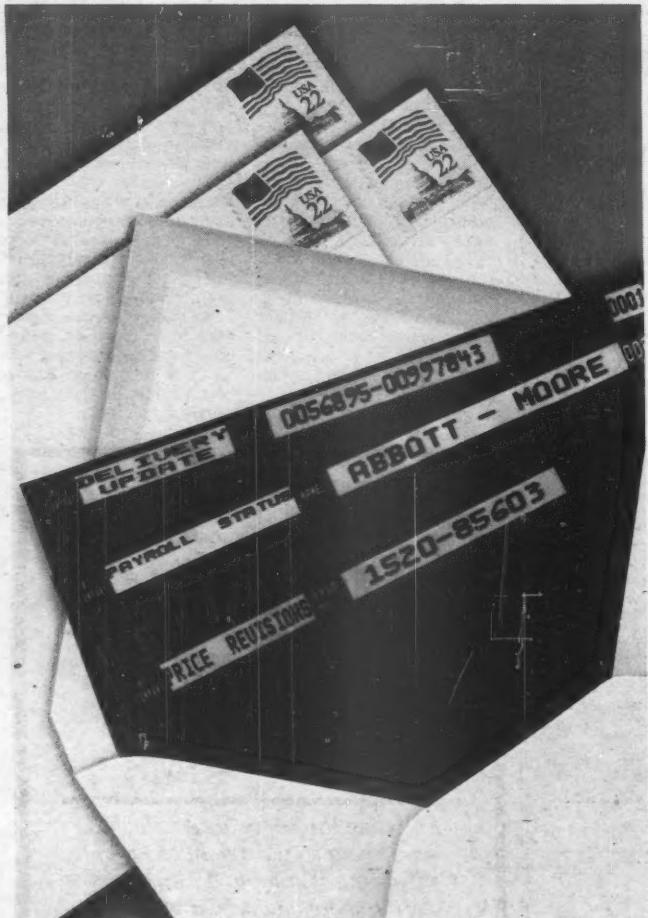
The AT keyboard was replaced by a Key Tronic Corp. unit with a touchpad to segue between services.

According to Programit Vice-President of Marketing Bill Rothfarn, the firm encountered problems synchronizing the various financial services so they could be simultaneously accessed by the AT and providing coding so the financial data could be displayed on the 3295.

Rothfarn points out that while IBM still considers plasma display to be an emerging technology (between 4,000 and 5,000 displays have been shipped since the product became available four years ago), it never considered the financial services sector as a proving ground. "They looked at computer-aided design and manufacturing as probable applications," he remarks.

Approximately 13 workstations are already in use, shared by two traders each, and four are awaiting assignment, Miller says. Shearson plans to install 40 to 50 workstations by mid-year and is weighing the possibility of equipping regional trading offices with the system.

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MICROCOMPUTERS



SMALL TALK

Edward Warner

Candor still best policy

First, Adam Osborne slid away from the computer industry limelight as the company he founded went bankrupt. Next, Apple Computer, Inc. cofounder Steve Jobs was forced out of the chairmanship of his firm. Most recently, Morrow Designs, Inc., a firm founded by the colorful George Morrow, filed for bankruptcy under Chapter 11.

Most of the slightly outrageous, always outspoken leaders of the personal computer industry apparently are being pushed aside, either by raw economics or dissatisfied shareholders. A pessimist might say that the era of outspokenness in the personal computer industry has ended.

Certainly it is rare of late to hear such one-time upstarts as Lotus Development Corp.'s Mitch Kapor or Microsoft Corp.'s Bill Gates say anything that does not sound neatly laundered and pressed by their corporate public relations departments. No longer can a reporter call a Lotus exec directly. Such calls must now go through the company's public relations department, in which "we'll get back to you" may mean "you might hear from us—in a week."

The reasons for the cautiousness go deeper than simply the "graying" of the personal computer industry. At root, cautiousness pervades the public statements of many in the industry because so many companies are now publicly held. Indeed, as more PC industry players go public (as Microsoft did last

See CANDOR page 27

Warner is editor of the Computerworld News Service.

Advertisement

Oracle unveils productivity tools for SQL/RT on the IBM RT PC

Oracle Corporation has announced six software products for the newly-announced IBM RT PC system. The packages run with IBM's SQL/RT relational DBMS, which was developed by Oracle for IBM. Oracle also announced immediate availability of its full ORACLE product line on the RT PC/AT co-processor.

According to Oracle Director of Product Marketing, Ken Cohen, "The SQL/RT product which IBM is marketing on the RT PC provides a robust relational DBMS. Since Oracle was the source of SQL/RT, we feel well-suited to offer our other products directly. They provide even greater flexibility and decision-support capabilities to RT PC users."

□**Pro*Fortran:** The Pro*Fortran precompiler allows RT PC programmers to embed SQL database language statements in the middle of their Fortran programs. It is intended for Fortran programs which must access or manipulate SQL/RT database information.

□**Pro*SQL:** Pro*SQL is a general-purpose call-interface to SQL/RT. Using a simple set of programming calls from a variety of languages supported on the RT PC, the programmer can access SQL/RT.

□**SQL*IAF:** The SQL*IAF (Interactive Application Facility) package is a complete application generator and run-time system for forms-based applications. It is a complement and

extension to the Easy SQL/RT component of IBM's SQL/RT.

The SQL*IAF screen painter lets users design forms using what-you-see-is-what-you-get techniques. Multi-table query/update forms can be easily produced for demanding applications. Also, SQL*IAF lets users apply data editing and validation criteria to data entered into forms. Finally, SQL*IAF provides extensive support for non-IBM terminal types, such as DEC's VT-220.

□**SQL*RPT:** SQL*RPT is a report writer and formatter for use with SQL/RT. Using simple commands, users can create reports of almost unlimited sophistication from their databases.

The database information can also be included in documents formatted with SQL*RPT, allowing text and database processing to be combined in one easy-to-use interface suitable for developers and end-users alike.

□**SQL*Calc:** SQL*Calc is a Lotus 1-2-3 compatible spreadsheet integrated with the SQL/RT DBMS. Users can place SQL statements into the cells of their spreadsheets, retrieving and updating SQL/RT data automatically. Large SQL/RT databases can be shared among spreadsheets users, with all of the database instantly available to them.

□**SQL*Link:** SQL*Link provides a micro-mainframe link which allows intelligent transfer of database information be-

tween SQL/RT on the RT PC and the Oracle relational DBMS running on IBM PCs and a variety of mainframes and minis.

SQL*Link lets users exchange information between PCs with ORACLE and the RT PC, with the RT PC serving as a Host.

The package also lets users of SQL/RT exchange database information with a mini or mainframe running ORACLE.

□**PC/DOS Support:** The ORACLE relational DBMS, 4GL and DSS tools are also available to run on the IBM RT PC/AT co-processor option.

Oracle produces and markets the ORACLE relational DBMS, 4GL and DSS software. ORACLE runs on a wide range of computers, including IBM mainframes, DEC, DG, HP, Stratus and most other minicomputers, and a wide variety of micros, including the IBM PC family.

Oracle distributes its products through a worldwide network of 30 direct sales offices, through the Authorized Oracle Dealer network, and through VARs which participate in the Oracle Alliance program. With its direct OEM marketing efforts, ORACLE is used by 39 of the top 50 multi-national corporations and at thousands of sites overall.

For further information, contact Oracle Corp., Dept. CWST3, 20 Davis Drive, Belmont, CA 94002, 1-800-345-DBMS.

INSIDE

Application vendors detail support for IBM's PC Convertible/27

NEW THIS WEEK

- Pick Systems upgrades its operating system for IBM's PC XT
- True Basic is ported to the Apple Macintosh
- For more on these and other new products, see pp. 87-108.

INSTANT ANALYSIS

"The real leverage you have is to provide recognition. When the guy down in finance who wrote the application looks like a star, that's the biggest carrot you can put in front of people."

— Robert Perry, marketing support manager for applications, Lotus Development Corp., on encouraging standard ways of building applications

IBM trumpets experimental speech recognition system

By Alan Alper

NEW YORK — In a rare display of technological chest beating earlier this month, IBM demonstrated a desktop speech recognition system that creates documents in response to human dictation.

The experimental product consists of a Personal Computer AT, two specialized speech recognizer subsystems and a directional microphone. It can recognize discrete utterances in real-time from a 5,000-word preprogrammed vocabulary and can transcribe sentences with 95% accuracy, IBM researchers said.

IBM officials would not say if or when the technology would become commercially available. In its current form, however, IBM said the prototype could handle office correspondence.

The prototype uses new CMOS digital signal processing chips in the two speech recognizer subsystems. One subsystem transforms the speaker's words into a string of "labels," encoding the speech. The other subsystem matches the labels to the system's preprogrammed vocabulary.

The system learns characteristics of each user's voice as the user reads a short document into the microphone. In practice, the system chooses the "candidate" word using a statistical model drawn up from an analysis of 25 million words. It selects the probable word as the person continues to speak and can distinguish between words that sound alike but are different through a built-in contextual ability. Punctuation is added verbally.

Frederick Jelinek, leader of the team that developed the prototype at the Thomas J. Watson Research Center in Yorktown Heights, N.Y., admitted IBM has a long way to go before selling speech recognition products. The main stumbling block, he said, is the system's inability to recognize continuous speech. Because the prototype only recognizes discrete words, users have to speak slowly and with pauses to ensure accuracy of word recognition.

Other challenges that must be faced, he said, include expanding and personalizing vocabulary coverage, improving resilience.

See IBM page 26

Ashton-Tate offers utility packages

By David Bright

TORRANCE, Calif. — Ashton-Tate's Publishing Group has announced several software packages that add to the capabilities of Dbase III Plus and Framework II and that cost between \$39.95 and \$89.95.

The \$89.95 Dbase Tools for C: Programmer's Library includes an engine that links programs written in the C language to Dbase III Plus and also provides mathematical, financial, statistical and programming functions.

The four Framework II products are Decision Modeling, Project Analysis, Timeframe and Framelock.

Through the use of decision matrices, the \$69.95 Decision Modeling package helps managers to organize and analyze information. The software weighs the conse-

quences of different choices, graphs decisions and alternatives and saves and reuses existing analyses.

Also priced at \$69.95, Project Analysis assists managers in defining, organizing and planning each step of a new project. A Skills Bank lists personnel and their special skills for task assignments while a Resources Bank compiles available resources to meet project requirements.

The \$39.95 Timeframe utility, which works with Framework and Framework II, features an appointment book, a calendar, a calculator and an office assistant.

Also carrying a \$39.95 price tag, Framelock performs file encryption and features two levels of security, password protection and an advanced cipher.

These add-ons are available now.

Advertisement

MICROCOMPUTERS

IBM trumpets speech system

From page 25

tance to extraneous noise and designing a suitable editor to facilitate document creation.

IBM is developing a 20,000-word speech recognizer for the PC AT, Jelinek said. It currently has a prototype that runs on IBM 4300-

class machines, he added.

In demonstrating its speech recognition technology, IBM broke with its custom of not discussing products under development. IBM did so, Jelinek said, because the prototype represents a significant advance in the technology.

The prototype, he noted, requires only 640K bytes of storage and contains much of the functionality of the real-time speech recognizer IBM demonstrated in 1984, which

required 6M bytes of storage and was based on an IBM 4341, three floating-point array processors and large-scale disk storage units.

Flaunt it'

"We're proud that no one else has it," Jelinek remarked. "If you've got it, flaunt it."

Industry analysts, however, said IBM may have provided a glimpse into its speech recognition product strategy because of technolo-

logical advances made by competitors that are shipping, or close to shipping, commercial products.

Amy Wohl, president of Wohl Associates, Bala-Cynwyd, Pa., pointed to Dragon Systems, Inc. of Newton, Mass., and Kurzweil Applied Intelligence, Inc. of Cambridge, Mass., as two firms with promising speech recognition products.

"IBM could be getting nervous that they're far away from having a commercial

product and these other companies are stealing their thunder," she said. "Even though these firms are not able to deliver the same level of technology, they are making commercially available products."

Mike Tomasic, president of Kurzweil Artificial Intelligence in Waltham, Mass., said his firm has been shipping a 1,000-word recognition system since last June for use with a wide variety of microcomputers and mainframes. Listing for \$65,000, the Kurzweil Voicewriter 1000 has been delivered to "several hundred customers," he said, declining to specify names.

Kurzweil prototypes

Kurzweil AI has working prototypes of a speech recognition system that, with the addition of a personalized vocabulary, can understand between 5,000 and 10,000 words, Tomasic said. Beta shipments are expected to commence this year.

Kurzweil AI's new product recognizes discrete words, Tomasic said, but comes closer to approximating real-time operation than the experimental product demonstrated by IBM.

"It's hard to tell the difference between continuous speech and discrete words because our product recognizes words with only a one-tenth of a second pause," Tomasic claimed.

Dragon Systems will make two speech recognition product announcements this month, according to Jim Baker, the firm's chief executive. The 4-year-old company will disclose availability of its Voicescribe 1000 speech recognition software package for microcomputers, which is said to recognize up to 1,000 words, and will demonstrate 2,000-word capability.

However, Peter Kibler, a senior consultant at International Data Resources, Norwalk, Conn., predicted that broad acceptance of speech recognition products in the corporate environment will not occur until accuracy tops 99% and continuous speech is a reality.

"Even with 95% accuracy, that's one out of 20 words on average that is incorrect. That's not very good," he said. "Therefore, I don't think any of the products today will penetrate the broad market."

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MICROCOMPUTERS

IBM laptop software unveiled

By David Bright

When IBM introduced its PC Convertible laptop earlier this month, a number of software vendors announced support for the system's 3½-in. floppy disk format. However, many had not yet decided how to package and sell the 3½-in. version.

Among suppliers announcing 3½-in. media support along with specific policies were Borland International, Inc., Computer Associates International, Inc. and Living Videotext, Inc.

Existing customers of the Scotts Valley, Calif.-based Borland may order PC Convertible programs for a \$10 fee that covers manufacturing, shipping and handling. All 13 of Borland's software products, including the Reflex data base management program and the Sidekick desktop organizer, should be available next month. Prices for Reflex (\$99.95), Sidekick (\$84.95) and the company's other programs are the same for both media formats.

Three PC Convertible programs are available from Computer Associates International's Micro Products Division in San Jose, Calif. These programs — Super Calc 3 Release 2 (\$395), Superproject Plus (\$495) and Easywriter II (\$395) — come with both 3½-in. and 5¼-in. disks. Current users may obtain a product in the 3½-in. format for a \$50 fee.

Candor still best policy

From page 25

month), the reticent mood will spread.

The world is a more lighthearted place for the string of clever industry one-liners in Morrow's little red book, *Quotations from Chairman Morrow*. But could Morrow have said, "Computer companies are like desert flowers, they bloom overnight and are gone" if he were on the eve of a public offering?

As the once-freewheeling PC companies take on the mantle of silence, they may think they are modeling themselves on the biggest and most successful player in the industry.

But if they are attempting to ape IBM, they should look again. Even IBM has come to realize it has paid a high price for its goal of a bland corporate image and "no comment" attitude and shows some signs of turning away from its old ways.

Recently, Big Blue engaged in an act that may be unique in its history: In February its PR people called reporters to discuss IBM's most recent 4300 upgrade and 3090 uniprocessor announcements, both which had occurred a month earlier.

In making those calls, IBM's PR folks acknowledged the damage that can be done by close-mouthed behavior. IBM had never held a press conference for the announcements, and the company said it thought that misimpressions about the machines had arisen.

With so many PC industry players taking their cues from IBM, it is good to know that their Big Blue role model just might yet teach them a thing or two about the value of candor.

Living Videotext of Mountain View, Calif., has begun shipments of PC Convertible versions of ThinkTank, a \$195 program used to organize and manage hierarchical structures of facts and ideas and Ready, a \$99.95 memory-resident outline processor. For \$40, Living Videotext will send a 3½-in. version of a program to owners of the 5¼-in. versions.

Both Borland International and Computer Associates International said their special deals for existing customers are designed for users who may work on one micro at the office and another on the road or at home. The license agreements prohibit users from running the software on a second office machine.

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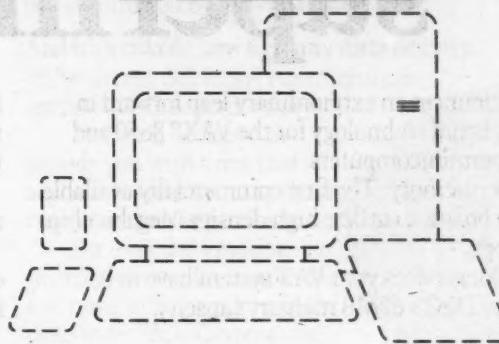
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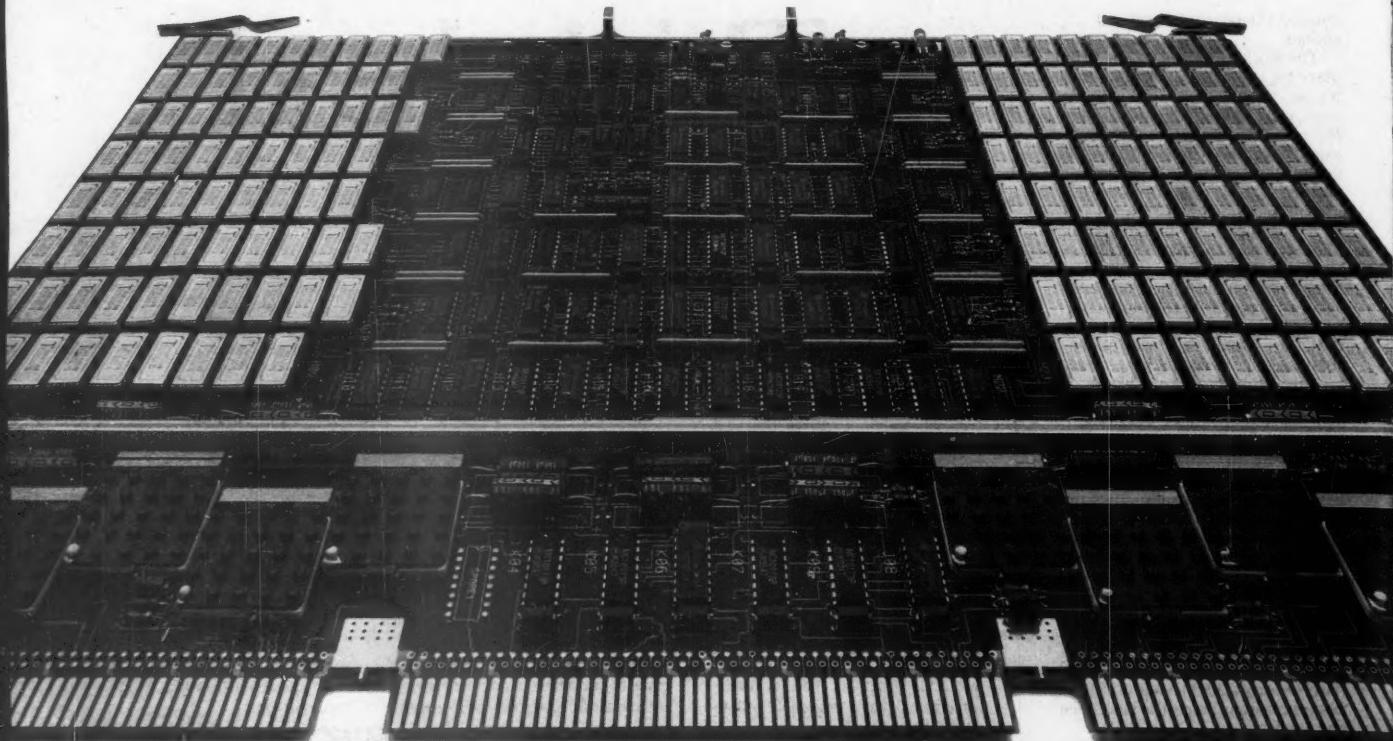
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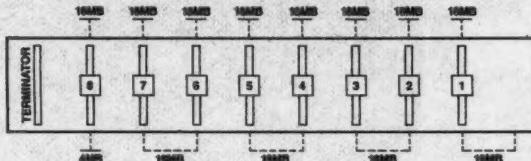
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COMMUNICATIONS



WIRE TAP
Walter E. Ulrich

X.400 protocol in the mail

Also known as the Message Handling Standard, X.400 will do the same for messaging as the X.25 standard did for data communications. It will create order out of chaos and interconnection out of incompatibility.

The X.400 standard specifies the format in which messages can be exchanged between various systems. It is a broad standard that goes beyond text messages to include voice and a wide range of message delivery options. The Consultative Committee on International Telephony and Telegraphy formally approved the standard in 1984.

Electronic mail has every bit as great a potential for business use as the telephone. It is fast, efficient, convenient and inexpensive. Unfortunately, most in-house message systems and electronic mail subscriber services are incompatible. Electronic mail provides a communication oasis for communities of interest that subscribe to the same system, but because there are no aqueducts between different systems, a vast electronic desert separates sets of users.

When users are unable to send a message electronically to all their intended recipients, they often use the lowest common denominator that will reach everyone: They simply dictate a memo and send out copies through interoffice or U.S. mail.

Even without intervendor connectiv-

See X.400 page 34

Ulrich is president of Walter Ulrich Consulting, based in Houston.

GTE Sprint challenges AT&T, MCI with high-volume, dedicated service

By Mitch Betts

WASHINGTON, D.C. — GTE Sprint Communications Corp. has begun to offer a dedicated-line service called Sprint Advanced WATS Plus, designed to compete with MCI Communication Corp.'s Prism I service and AT&T's Megacom rates for high-volume customers, the firm announced recently at the Federal Office of Systems Expo.

GTE Sprint officials asserted that the service is priced competitively with MCI's Prism I and offers average savings of 10% to 12% off AT&T's Megacom rates.

The officials said the pricing structure is not sensitive to the number of lines in use and, thus, gives customers the flexibility to change the number of dedicated circuits as needed.

Sprint Advanced WATS Plus can

be used in conjunction with digital T1 or analog connections to the local telephone company or through customer-provided bypass, the vendor said.

The monthly base charge is \$1,000 per location plus a \$5 port charge for each active circuit. Calls are billed at flat rates calculated in 6-sec. increments and based on distance and time of day.

The new service, aimed at customers with monthly usage of \$10,000 or more, is available from 66 major cities and includes international dialing to 20 countries served by Sprint, the Burlingame, Calif.-based vendor said.

GTE Sprint and United Telecommunications, Inc. are in the process of forming a partnership, to be known as U.S. Sprint Communications Co. [CW, Jan. 20].

Users seek net management

Effective control seen as user priority, not reality

By Peggy Watt

LOS ANGELES — Managing multivendor communications systems of growing sophistication proved to be the dominant theme of the recent Network Management Technical Control conference. But while the technical sessions dealt primarily with broad issues relating to cost justification, design, user support and vendor relations, many attendees seemed more interested in the nuts-and-bolts diagnostic and monitoring tools on display on the exhibit floor.

James Clay Jr., data communications engineer for TRW, Inc.'s Operations and Service Group in Redondo Beach, Calif., was scouting equipment for diagnostic monitoring to manage his multivendor network, which consists of several local-area networks as well as radio and laser links to four remote sites.

He said that test equipment at every

site is "desirable but not feasible. Right now I need to rely on user feedback to be sure equipment is operating properly."

Telecommunications project director Janet L. Bruman was gathering information on network options for the North Bay Cooperative Library System in Northern California. She said she could easily assemble a formidable wish list but that her real list was limited by the public agency's budget restrictions.

The cooperative of six county libraries is looking for a turnkey network system that would enable several dozen terminals to share records and information residing on four separate computers. "Some of the administrative problems are at least as bad as the technical problems," Bruman said.

Exhibitors appeared to be responding to the burgeoning demand for more versatile and sophisticated network management tools. "In a multivendor environment, managers are having to be more savvy, because they're in control of their own destiny."

See **USERS** page 36

NEW THIS WEEK

■ Northern Telecom adds a teleconferencing system and workstations to Meridian DV-1

■ Equatorial Communications offers Private Newswire satellite message generation and delivery system

■ For more on these and other new products, see pp. 87-108.

INSTANT ANALYSIS

"Effective multi-vendor network management is the key ingredient in our strategy for the foreseeable future, centering on providing quality service to both internal and external customers at competitive costs."

— David Mieszcanski, vice-president, global communications operations, Bankamerica Corp.

AT&T, IBM vie for net lead

By Elisabeth Horwitt

"Users hoped that AT&T and IBM's emergence as dominant players in the networking market would clear things up," Architecture Technology Corp. President Kenneth Thurber recently told an audience of user and vendor organization representatives. "But it turned out just the opposite: Users now are more confused."

According to Thurber, the two giants bring complementary strengths and weaknesses to the network wars. "AT&T has the more sophisticated transport mechanism, while IBM is strong when it comes to application interfaces."

Thurber elaborated that AT&T's primary data network products, Datakit and Information Systems Network (ISDN), "are faster, cheaper and offer much higher performance" than IBM's Token-Ring net-

work, which he said is "very complex and expensive and hard to manage under a heavy traffic load."

Datakit is now "quietly being sold to regional Bell operating companies under the name of Colan," while ISDN is marketed as a user-premise data network, according to Thurber.

On the other hand, Thurber said, neither AT&T nor the Open Systems Interconnect networking model that AT&T supports, offer a network operating system comparable to IBM's System Network Architecture (SNA).

"SNA is a very mature product with a rich set of application interfaces which are open to other vendors," Thurber said. AT&T needs to develop a similar set of offerings that will take care of networking

See **AT&T** page 34

Pac Bell to augment DDS

Channel proposal to aid network management

By Peggy Watt

SAN FRANCISCO — Pacific Bell Telephone Co. plans to offer a secondary channel enhancement for its Digital Data Service (DDS) for user control of network management and related functions, the company announced recently.

Pacific Bell, an operating company of the Pacific Telesis Group, will submit the new service proposal to the California Public Utilities Commission for approval sometime in mid-year, a spokesman said. The company hopes to implement the new service in the fall.

The secondary channel would allow DDS subscribers to do their own network management, including control, analysis and diagnostics, moni-

toring and telemetry on a parallel channel without interrupting normal data flow, said Mike Trombetta, Pacific Bell product manager.

It would require a new Channel Service Unit/Data Service Unit (CSU/DSU) to be installed at the customer's premises and a new channelizing unit at the central office serving the customer, Pacific Bell said. The DSU handles timing recovery, synchronous sampling and bipolar digital conversion needed for the DDS transmissions and interfaces with the customer's transmitting equipment. The CSU acts as an analog modem connection to the copper wire.

Pacific Bell's private-line digital transmission system handles data among two or more points at rates of 2,400, 4.8K, 9.6K or 56K bit/sec. The proposed secondary channel would operate on an independent parallel path at subrates of 133, 266, 533 and 2,666 bit/sec.

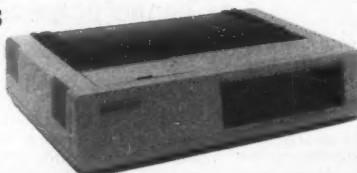
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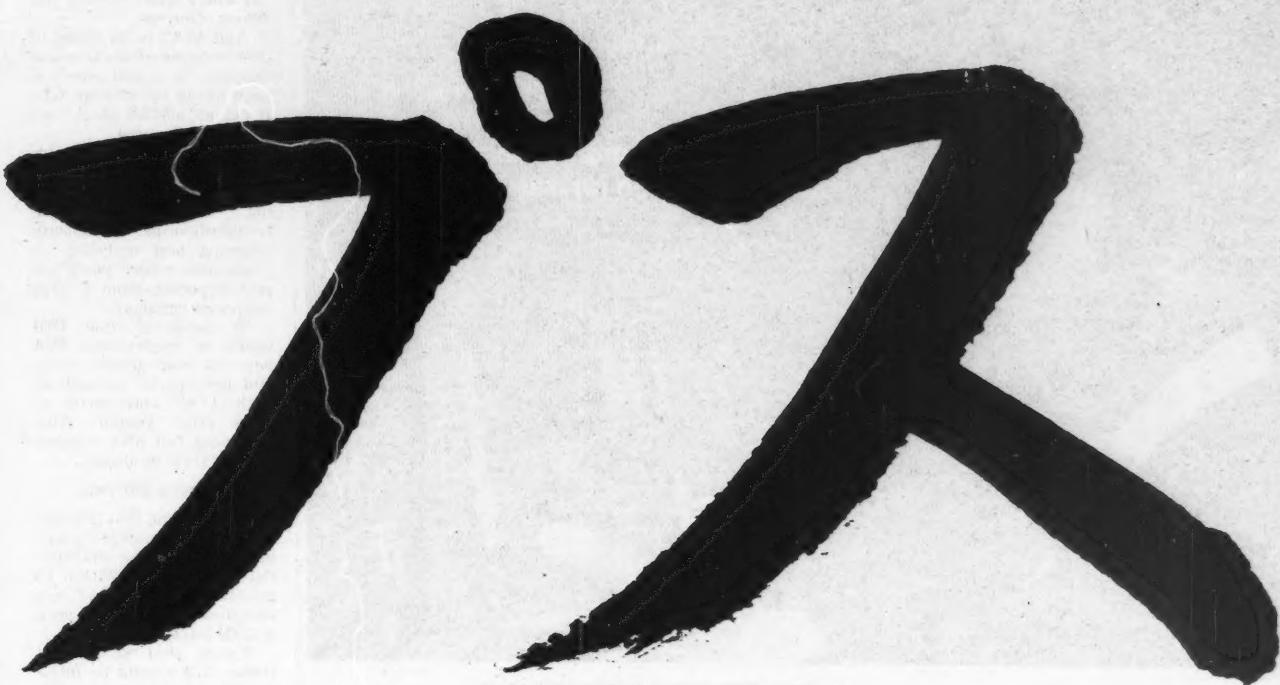
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AMERICA

COMMUNICATIONS

X.400 is in the mail

From page 31

ity, electronic mail has been growing at a rate of between 75% and 90% annually. The Office of Technology Assessment projected that more than 10 billion messages will be originated electronically in 1990. Given the multivendor interconnection provided

by the X.400 standard, this is attainable.

Vendor acceptance of X.400 is growing rapidly in both the U.S. and Europe. Foreign Postal, Telephone and Telegraph administrations have endorsed X.400 and will insist that message systems in their countries conform to the standard.

Fifteen out of 17 leading electronic mail vendors recently interviewed by Walter Ulrich Consulting were firmly committed to X.400. One

vendor, IBM, was unwilling to comment.

But while IBM has a strong vested interest in pushing its own Document Interchange Architecture/Document Content Architecture (DIA/DCA) as an electronic mail standard, pressure from European customers should force IBM to provide bridges to X.400, as it did to X.25.

Like X.25, however, X.400 is far from a mature stan-

See X.400 page 36

AT&T, IBM vie for lead

From page 31

functions, such as the ability to distinguish between local and remote connections, he added. "Otherwise, such tasks must be taken care of at the application level," forcing users to rewrite their programs to deal with each new change in the network.

Thurber claimed that LU6.2 enables users to build "a daisy chain of applications which use each others' results; although I'm not saying this can be done easily or for free."

IBM needs to provide a more powerful implementation of SNA on its Token-Ring network, which so far only connects IBM Personal Computers directly, Thurber said.

He added that IBM needs to address the growing user demand for links to long-distance networking standards such as T1 and Integrated Services Digital Network, areas where AT&T already has strong offerings.

And AT&T is far ahead of IBM in terms of multivendor support, "a crucial aspect of networking for anyone who is not an all-IBM shop," according to Thurber.

He added that AT&T also "has a leg up" over IBM when it comes to tools for doing network monitoring, troubleshooting, capacity planning and updating — "functions where you'd expect expertise from a large telephone company."

He predicted that IBM would be emphasizing SNA network management more and more, partly to catch up with AT&T and partly to block other vendors from achieving full SNA integration for their products.

One-upmanship with nets

Thurber said that IBM and AT&T would engage in one-upmanship in the networking speeds arena. Within 18 months, he said, AT&T will introduce an ISN model with a 128M bit/sec. backplane.

Within that same time frame, IBM should be introducing an optical-fiber token ring with 256M bit/sec. aggregate throughput, he added. Top speed for the Token-Ring net is currently 4M bit/sec., as compared with ISN's 8M bit/sec. optimal rate.

As companies continue to move from departmental to corporate networking solutions, they will run head on into the IBM vs. AT&T confrontation, Thurber said.

He added that, formerly, upper management was rarely involved in buying decisions. "Now, you have conflict between data processing departments that traditionally deal with IBM and telecommunications departments that have always dealt with AT&T."

Cabling is one fundamental issue of the conflict, which communications managers need to resolve with reference to cost, risk and strategic direction, Thurber emphasized.

"Businesses have the choice of either putting in giant raceways for future cable installations or installing every possible type of cable to avoid running out of capacity," he said.

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COMMUNICATIONS

Users seek net management

From page 31

"ny," said Dave Ryan, who was showing Digitech Industries, Inc.'s protocol analyzer.

Digilog, Inc. was exhibiting its newest protocol analyzer, which monitors multi-vendor network equipment "and avoids finger pointing,"

said Harold Draper, western regional manager of the San Jose, Calif.-based company. The Digilog Model 300 is priced at \$4,995.

Draper admitted the equipment could be overkill for small, single-vendor networks but not, he added, for companies that now have to deal with a multitude of carriers and equipment vendors "where before, a simple phone call to friendly AT&T was enough."

Draper pointed to an in-

crease in the sophistication of test equipment in general. "A few years ago, we had basically only bisynchronous and asynchronous" monitoring. Today, there are management tools for IBM Synchronous Data Link Control, X.25 and IBM Systems Network Architecture (SNA) networks.

The bit error-rate test can monitor standard AT&T signals to determine whether a problem is in a line or transmitter, he said. "It keeps Bell

on its toes. They can't just say, 'Nope, it's not the line.'"

During a seminar on IBM SNA network management, however, Atul Kapoor, vice-president of consulting for Kaptronix, Inc., chided vendors on the gaps that exist in current network management products.

"There's still a lot of progress to be made," he said. "Networks do not exist to provide intellectual challenges for managers."

Several speakers empha-

sized that network managers need to do their own monitoring and troubleshooting in order to serve users and deal with vendors effectively.

Troubleshooting plans

Gabe Kasperek, president of data communications consulting firm Kazcom, Inc. recommended that managers adopt specific troubleshooting procedures that include defining a problem, isolating it and restoring the system.

He told managers not to underestimate the last step. "If we're substituting equipment, you'd better verify. The best way to get the user into irate mode is to say everything's all right, and it's worse," he emphasized.

Keeping equipment inventory up to date and thoroughly documenting installation procedures are often "matters of self-defense," Kasperek said, "because vendors are not always so careful. You must have your own quality control. If you haven't tested, Murphy's Law is going to apply."

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X.400 is in the mail

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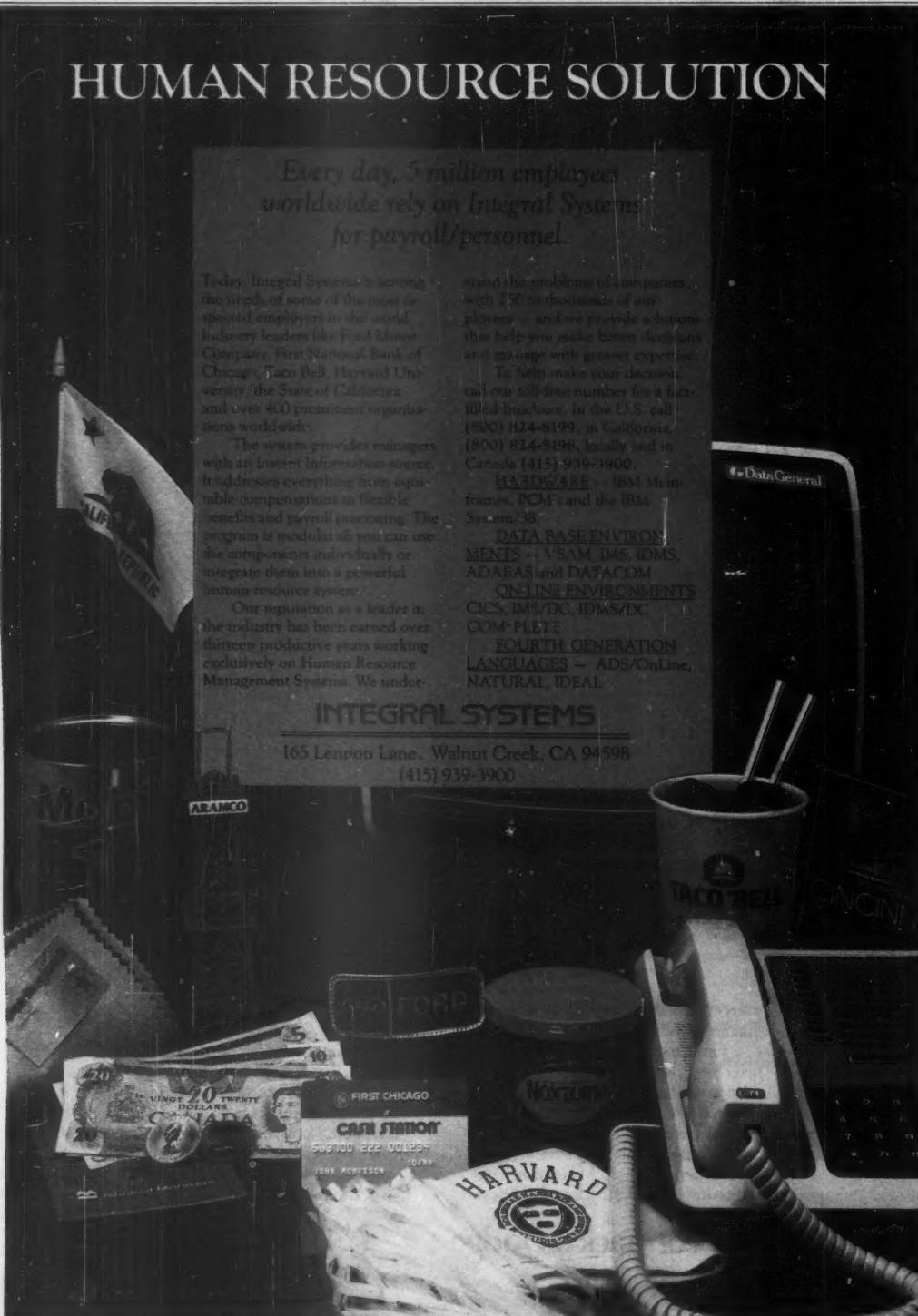
hard. Two issues still being debated are settlement and directory. Settlement deals with the question of how to split fees when messages are handled by more than one carrier. Since revenues are ample and there are precedents for dealing with such matters, this issue should be resolved soon.

The directory issue is more complex. An electronic mail directory should be easy to use and should uniquely identify recipients' addresses anywhere in the world.

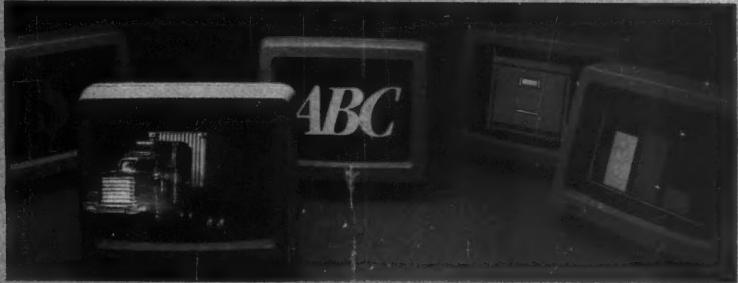
The most friendly and elegant solution is a distributed data base, but that raises several issues relating to directory ownership and control. Vendors zealously guard the names of their customers, and companies hesitate to publish employee lists.

Even though some gaps and problems remain, knowledgeable observers expect prompt resolution. They predict computer and office automation systems manufacturers will have achieved partial implementation of X.400 sometime this year and full implementation by 1987. Most electronic mail service suppliers are forecasting a 1987 or 1988 implementation.

Companies may still have to achieve compatibility with both X.400 and IBM's emerging DIA/DCA standard, but 1988 should see true interconnectivity among electronic mail systems.



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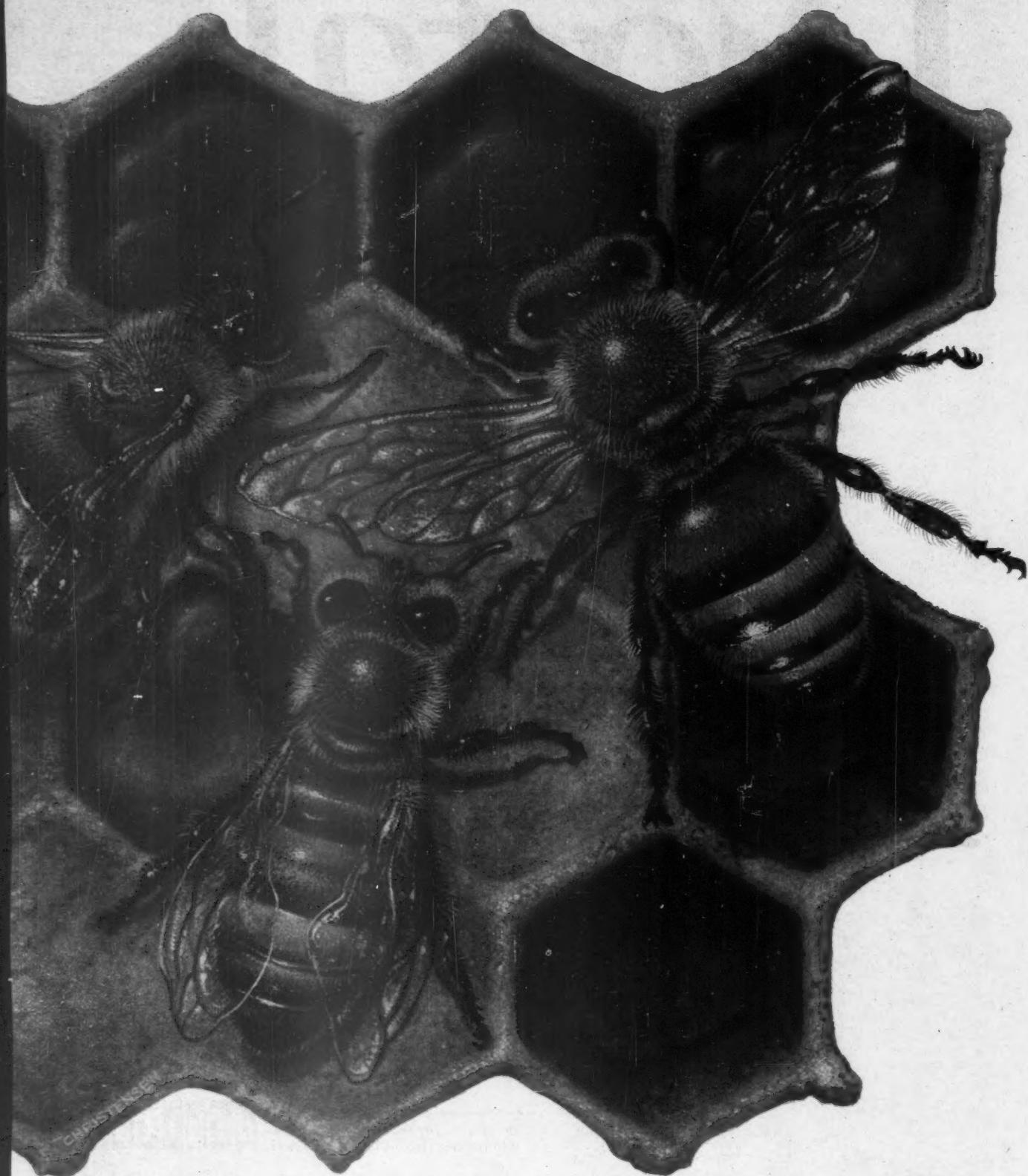
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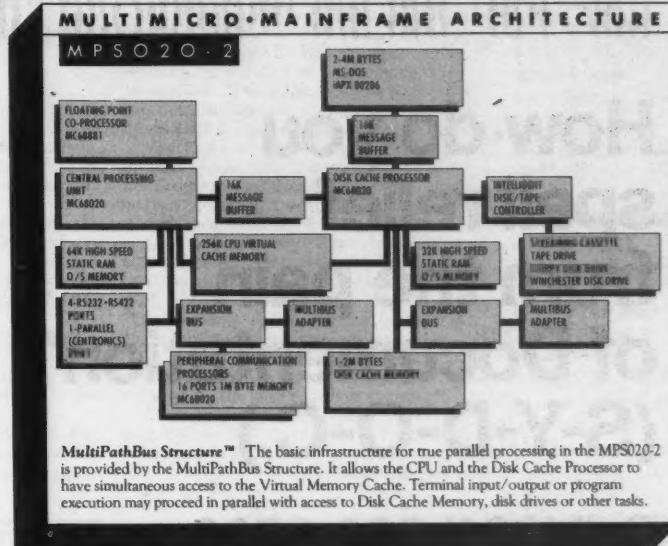
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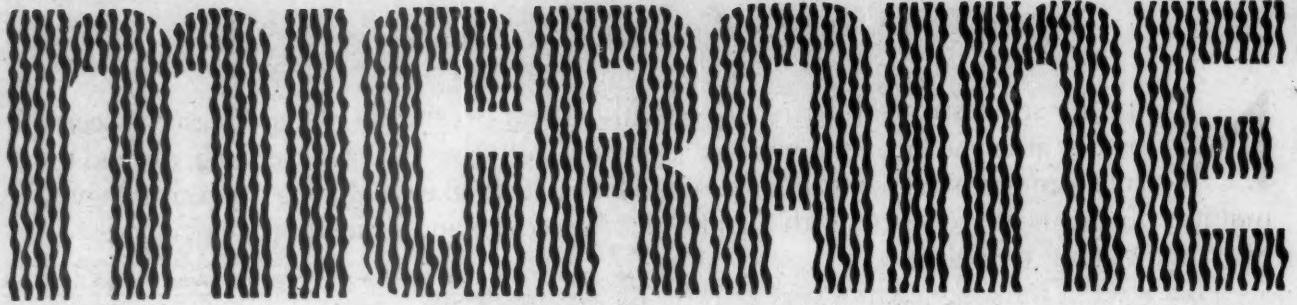
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SOFTWARE & SERVICES



SOFTLINE
Maura McEnaney

Secret society: Pick a winner

Although last month's International Spectrum show in Las Vegas was abuzz with talk of legal battles between Pick Systems and vendors of the Pick-based systems [CW, March 31], users and vendors were much more willing to talk about the growth of Pick installations and its migration into the corporate marketplace.

In its 21-year history, the Pick operating environment has attracted a dedicated group of users, drawn to the system for its Unix-like portability and its data base management capabilities. More than 2,000 software application packages have been written for the Pick system, which has approximately 60,000 multiuser system installations. But, according to San Francisco-based consultant Chandru Murthi, "Until recently, Pick has been a very well-kept secret."

If Pick ever was a secret, users and developers are working to get the secret out. Users were among those touting Pick at the show. "The data base retrieval capabilities make it ideal for business applications because it allows nontechnical people, with very little training, to retrieve data from the data base reasonably effectively," said Robert Clearfield of the Delaware Valley Underwriting Agency, Inc.

Manufacturers also said Pick needs a boost. Through the Spectrum Manufacturers Association, formed last year, manufacturers of Pick-based systems are establishing a set of standards for Pick implementations that they hope

See **SECRET** page 44

McEnaney is a Computerworld West Coast correspondent.

Glitch causes underbilling

Pacific Bell blames lost revenue on program error

By Jeffry Beeler

SAN JOSE, Calif. — A regional telephone company that failed to bill its customers for more than \$35 million in long-distance calls traced the accident recently to a logic error in a rewritten switching system program.

Between Jan. 13 and March 14, the faulty rewrite reportedly allowed more than 1.6 million Californians to conduct \$29.3 million in long-distance traffic over Pacific Bell Telephone Co. and AT&T facilities without being charged.

Billing omissions also occurred regularly between Nov. 27 and Jan. 12; that revenue loss to Pacific Bell alone totaled \$6.2 million, according to a company spokesman.

During the same period, AT&T was also shortchanged, again by millions of dollars, although the exact amount of the financial

error has proved difficult to reckon.

Pacific Bell plans to back bill callers for the long-distance charges it has failed to collect since Jan. 13. But the \$6.2 million revenue shortfall that accumulated between Nov. 27 and Jan. 12 is irretrievably lost because internal company policy prohibits back billings of longer than 60 days.

The roots of Pacific Bell's worst-ever billing mess go back to a comparatively minor programming change that was prompted by a recent shift in Federal Communications Commission regulations.

Until recently, the firm routinely exempted its customers from paying for calls lasting one second or less, the spokesman said. But then came a new FCC regulation that required phone companies to raise their no-call time limit to two seconds.

In effect, the spokesman said, "the change gave callers an extra second of access before the meter started running."

To comply with the revised FCC regulation, Pacific Bell was forced to rewrite the programs that control its electronic and

See **GLITCH** page 44

SOFTWARE NOTES

Warehouse expert system announced

John Landry, former McCormack & Dodge Corp. executive vice-president and now chairman of **Distribution Management Systems, Inc.**, Lexington, Mass., recently said his company will soon be bringing out a commercial application that will incorporate a series of expert systems for warehouse distributors.

The package is expected to be ready for alpha test by June, he told attendees at an artificial intelligence session of the recent ADAPSO conference in Houston.

The package will be one of the first commercial expert systems capable of

See **NOTES** page 44

Excellerator aids Stradis adoption

By Eddy Goldberg

MELVILLE, N.Y. — An automated graphics tool has proven an effective means of boosting acceptance of a structured development methodology among computer systems users in the Long Island DP headquarters of the \$9 billion National Westminster Bank USA.

When the company's Development Support Center decided to implement the concepts embodied in Stradis, a systems development methodology from McDonnell Douglas Automation Co., for the system department's 125 programmers and analysts, Systems Officer Clara O'Brien knew there would be resistance to the many handwritten forms and diagrams required by Stradis. In late 1983, she agreed to a trial use of Excellerator, a graphics tool from

See **EXCELERATOR** page 43

NEW THIS WEEK

■ Cadam, Inc. offers Basicad front-end software to its Geometry Interface Module

■ For more on this and other new products, see pp. 87-108.

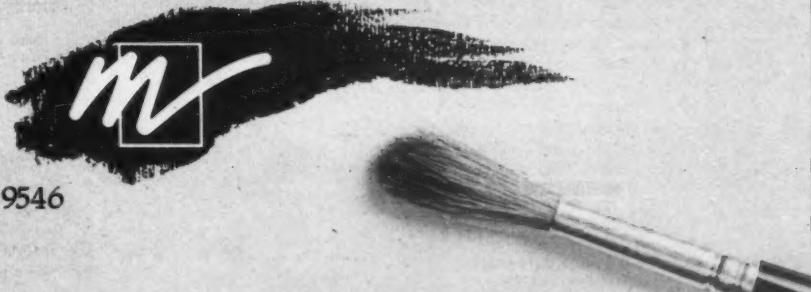
INSTANT ANALYSIS

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— Walter Williams, president of General Electric Information Services Co., speaking to members of ADAPSO earlier this month

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SOFTWARE & SERVICES

Excellerator aids adoption

From page 41

Index Technology Corp. of Cambridge, Mass.

"We looked for a computer-aided graphics package to make the methodology of Stradis more attractive for users to pick up," O'Brien said. "Without the graphics package, putting data flow diagrams down on paper would be a tough pill to swallow."

Adopting the Stradis methodology was O'Brien's attempt to bring order and control to "many different projects going off in many different directions." Automating the creation and modification of the detailed, hand-drawn data flow diagrams that would result from using Stradis' methodology would accelerate acceptance of the product, O'Brien reasoned.

But Stradis did not have its own automated graphics package at the time, and O'Brien had to search out other vendors. She looked at a product from Nastec Corp., but she said that in late 1983 it used too many keystrokes and required dedicated hardware. She wanted to keep her options open.

"It was a big investment. If Excellerator was not as useful as we had hoped, at least we would have the PCs left," O'Brien said. The bank is running Excellerator on stand-alone IBM Personal Computer XT's with 640K bytes of memory and 10M-byte hard disks.

Supports analysis

Dick Wilson, vice-president and head of Applications Planning at the bank, said that Excellerator is used to support analysis for developing the bank's mainframes' systems. "In the up-front, early stages of a DP project, we do the analysis on the PCs."

The bank does not use Excellerator to develop Cobol programs. He said it is used to do some design work when deciding what the system is going to look like.

Wilson said the chief benefit, in his eyes, is consistency during project development. "Each project was doing its own documentation. A tool like Excellerator makes it more convenient to do documentation the same way every time, increasing standardization."

Excellerator's mouse-driven graphics and menu-based user interface were big selling points, both in purchasing the product and in encouraging the bank's employees to use it. "Once people get the hang of it, they really like it. You almost intuitively start doing more when you think in more

graphic terms," O'Brien said.

Because diagrams are created more easily with Excellerator, programmers and analysts are more likely to commit design ideas to writing. Wilson said DP employees now tend to do the kind of documentation they had not done before because it was too complex.

More experimentation in design is done using Excellerator before trying to code programs. And changes are made more willingly when it

only takes a few movements with a mouse.

Communication during the analysis and design process is also improved with Excellerator. System users and designers can sit in front of a screen and make data flow diagrams that can be altered as they work. This speeds development time and catches potential problems as early in the development cycle as possible.

Another benefit of having automated data flow dia-

grams is that they can be retrieved and modified for different audiences.

O'Brien pointed out that Excellerator is also being used by other types of employees within the bank. Secretaries use it to create organization charts, and managers and analysts use it to prototype systems design.

Wilson said he used Excellerator to make a floor plan to show where computer terminals should be located. "People are being very cre-

ative in how they use the tool," he said.

The bank currently has a total of 13 copies of Excellerator in its New York and Long Island offices.

One of the results of the bank's use of Excellerator is that more people are using microcomputers. "The growth of PCs here is definitely a by-product of Excellerator. Once it got in, more and more PC packages began popping up on the hard disk," O'Brien said.

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Glitch causes underbilling

From page 41

electromechanical switching systems. But, in so doing, the firm inadvertently introduced a logic error that led the switching systems to treat 12% of their three-second-or-longer phone calls as if they had lasted only two seconds or less.

Apparently, the switches chose to drop or record calls randomly. "Some of the dropped calls lasted only three seconds and others three hours," the spokesman said.

The billing omissions went undetected for more than three months. Pacific Bell began to grow suspicious in mid-March, when it compared the volume of calls that were billed with the number completed and noticed a serious discrepancy.

An investigation uncovered the program logic error, which was apparently confined to the company's electromechanical crossbar switches, the spokesman said.

In part, the bug probably resulted from the relative difficulty of writing programs for electromechanical switching systems, which incorporate much older, less sophisticated technology than state-of-the-art electronic switches, he added.

Another factor may have been a shortcoming in Pacific Bell's software development or testing procedures.

"Although we tested the billing program after we finished changing it, we had no real safeguard in place to spot potential error in logic," the spokesman said.

But whatever the cause of the faulty rewrite, Pacific Bell has corrected the glitch to "make sure the same billing problems never happen again," he said.

Notes: ADR cuts prices

From page 41

running on standard mainframe computers.

In response to IBM's offer of free use of DB2 for six months, **Applied Data Research, Inc.** has cut its monthly charge for the OS version of **Datacom/DB** to put it more in line with IBM's pricing, according to Ann Morley, editor of International Data Corp.'s "Software Watch." A 3-year license costs \$3,975 per month, and a 5-year license costs \$3,735 per month.

Sperry Corp. has acquired **Foundation Computer Systems, Inc.**, the owner of the **Ally** software package. Sperry spokesmen say they wanted Ally as a companion package to their Mapper application generator.

Pansophic Systems, Inc.'s graphics and decision-support software is now being sold through **Data General Corp.'s Independent Software Vendor program**. Packages include D-Pict graphics and Ingot decision support to run on the DG 32-bit Eclipse.

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Secret society: Pick a winner

From page 41

will mean increased installations of the operating environment in the corporate DP departments.

Pick Systems founder Dick Pick said that in order for his operating system to be embraced by corporate MIS departments, the system must be ported to both mainframes and microcomputers.

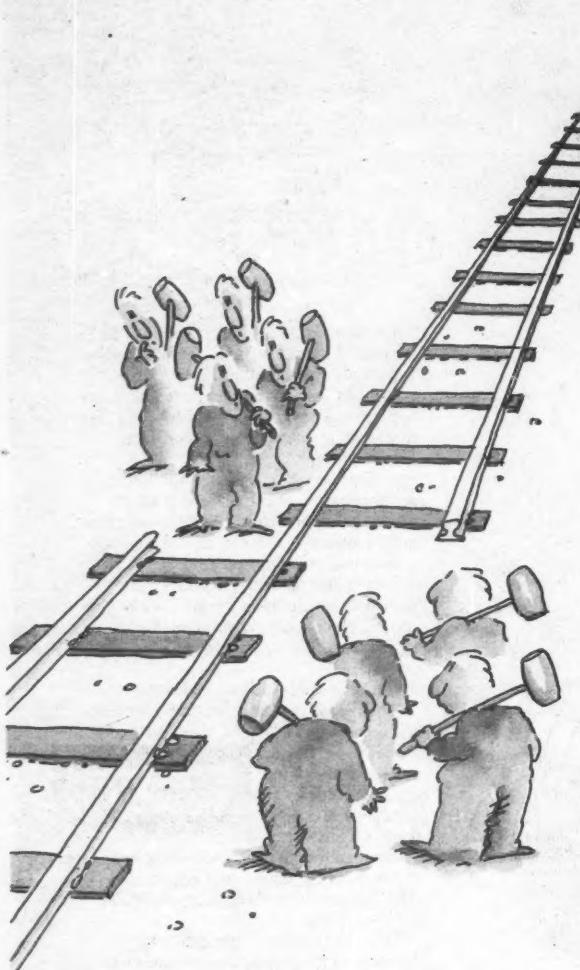
Pick initiated the move into small systems with the introduction of an IBM Personal Computer XT and AT version, but that in itself was not enough.

"Pick's move into the corporate mainframe world is just beginning," consultant Murthi said.

The Ultimate Corp. of East Hanover, N.J., is banking on the acceptance of Pick in that larger market with the recent introduction of Pick on an IBM 4300 series.

With implementations of Pick on systems like Digital Equipment Corp.'s VAX machines and Ultimate's added networking capabilities, Pick systems may be starting to get off the ground, Ultimate President Ted Sabarese said.

Whether MIS departments take to the system remains to be seen, Sabarese said. "It's just a question of a slow, hard sell."



Product Spotlight

Edited by Barbara Wierzbicki

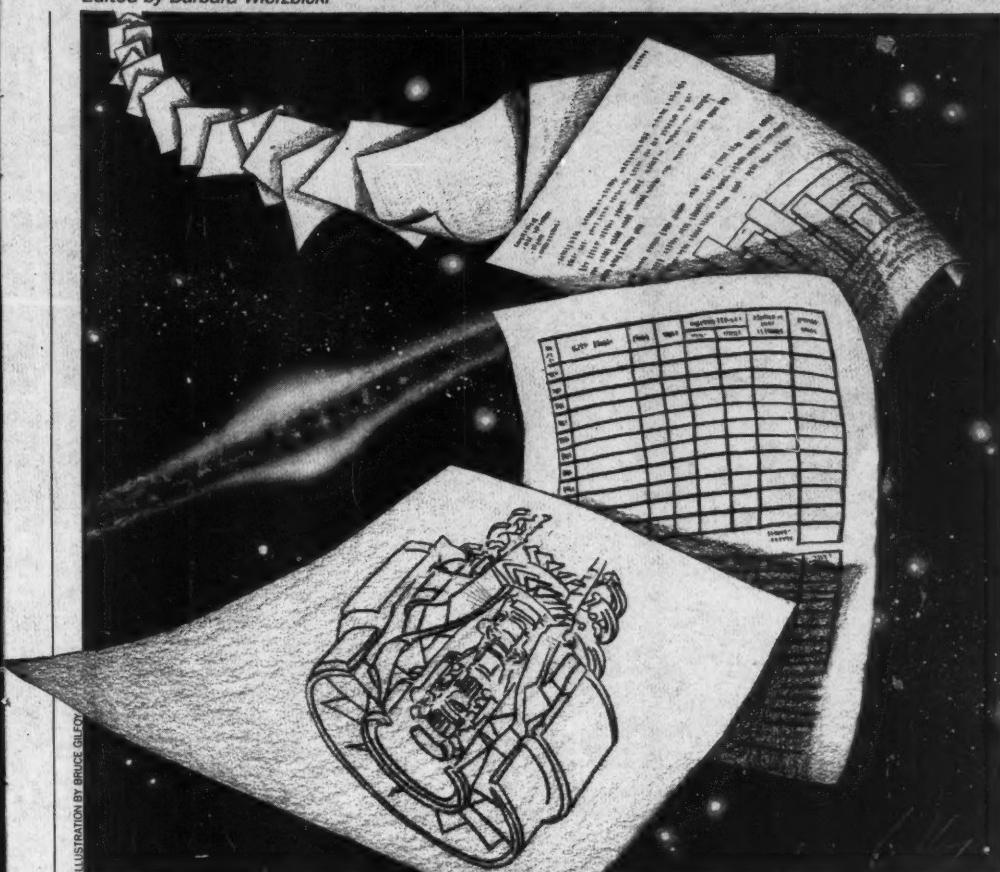


ILLUSTRATION BY BRUCE GILROY

Page printers For speed and volume, now is the time to buy

By AMY SOMMERFELD

The printer industry may be the latest example of entropy. As the universe expands, disorder grows.

Choosing a printer is not as easy as it used to be. No longer an insignificant output device at the end of a chain of office automation equipment, today's sophisticated page printers actually generate applications, letting users perform tasks previously done by an outside service — such as typesetting and overhead transparencies — or never performed at all, such as graphics illustrating reports, typeset newsletters and so on.

This changing market, replete with vendor price/performance battles and overlaps in printer technologies, makes purchasing choices tougher than ever. And because page printers are complex devices with many serviceable components and their own storage, processors and even programming languages, it is increasingly difficult for DP managers to treat these devices as commodities or to leave them to end-user departments to specify and service.

The seemingly infinite purchasing possibilities,

coupled with the rush of vendors that began selling page printers during the past 12 to 24 months, do have a positive side effect: The page printer segment now edges toward being a buyer's market. After some years of fanfare, this market has finally ripened enough to make it a safe bet for many users.

"The market has changed dramatically, and most of the major players are already involved. We have seen a lot of headway, and we will see more. But products you buy today will not be obsolete tomorrow," says Maureen McManus, product marketing manager at C. A. Pesko Associates, Inc., a consulting firm based in Marshfield, Mass.

Current page printer offerings include low-end models costing from \$2,000 and \$3,000 up to about \$10,000, printing 8 to 12 page/min, fitting comfortably on a tabletop and emulating popular impact devices for easy interfacing. High-end models can print 100 to 200 page/min, loom as large as a mainframe — one vendor boasts a printing system 16 feet long — and cost several hundred thousand dollars.

In the current trend, many vendors offer product lines that span much of the spectrum from

Sommerfeld is a Computerworld associate editor.

INSIDE

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Forms overlays: mechanical/optical vs. electronic/54

Comprehensive page printer chart/56-66



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Printer mart: Now is the time to buy

Continued from page 45

high end to low. Each page printer consists of three subsystems: a printing engine that puts the image on the page, control electronics that determine the imaging capabilities and software. Vendors vary any of these subsystems to provide a diverse product line. The diversity of models offered means any one company may use page printers for personal computer printing, for departmental output and for centralized DP printing.

At the low end, QMS, Inc. introduced a stripped-down laser model, the Kiss ("Keep it smart and simple"), for just \$1,995 at last year's Comdex/Fall '85 show, and Hewlett-Packard Co. reduced the price of the leading low-end page printer, the Laserjet, to \$2,995. Apple Computer, Inc. also reduced the price of its popular low-end laser printer, the Laserwriter, to make room for an upgraded Laserwriter Plus. For their part, the high-end models' prices are coming down slightly as the mid-range 60 to 80 page/min page printers' price/performance adds pressure.

With the technology for print engines — including laser, LED array, magnetic and ion deposition — re-

maining fairly stable, the vendors' chief vehicles for innovation and attracting customers lie in the electronic subsystems and printer software. In many instances, users can purchase just the speeds they need and just the features they want, with service contracts to boot.

Touted applications include more sophisticated graphics, dozens of fonts available on-line, mixed text and graphics, plotting, electronic forms overlay, digitized signatures or logos and what-you-see-is-what-you-get printing. Envelope feed, printing on transparencies plus sorting, collating and job separation all number among the accessory features.

Across the board, reliability has improved in the past 12 to 24 months. Excessive downtime and preventative maintenance with the high-end laser models scared many users away from even considering these models or their low-end cousins. But stories of full-time laser printer baby-sitters fade away as

vendors make the change to sturdier, mass-produced and fewer parts.

The trend now runs toward user-serviceable print engines with replaceable toner and drum cartridges. Even some of the high-end machines are sold with maintenance kits for in-house servicing. As newer models see more use, vendors raise their conservative mean-time-between-failure ratings and suggested print volumes to match user field experience. Many buying criteria apply to the entire range of page printers as vendors from high end to low end aim to offer the same popular features.

First and foremost, page printers appeal to users because they print high-quality type. Most page printer output is considered letter-quality for business use, although it does not duplicate output from a typewriter or daisywheel. On the plus side, the fonts produced by many page printers mimic typeset lettering and also allow more type to fit on each page, potentially saving companies money in paper costs.

On the minus side, some users complain that the type produced by laser printers is shiny and somewhat raised — a giveaway that the document was neither typed nor typeset. But in a business environment where highly automated office work has become nearly synonymous with good management, receiving a document produced by a computer may now carry connotations of sleek technology and sound management instead of implying impersonal, form letter correspondence.

Vendors measure letter quality objectively in the number of dots per inch for text and graphics. Early models offered clear, acceptable type at 240 by 240 dot/in., while many recent models offer 300 by 300 dot/in. For both high-speed and desktop models, this resolution seems to fit general-purpose requirements for letter-quality text.

Type setting and in-house publishing on a professional level may require resolutions up to 1,000 by 1,000 dot/in. and higher, but demand for this level of crispness remains low.

Most users cannot immediately distinguish the two resolutions, and since each dot represents a bit of data, the storage and transmission problems associated with increasing the amount of data exponentially to improve resolution will restrict demand for higher resolutions to niche

Continued on page 50

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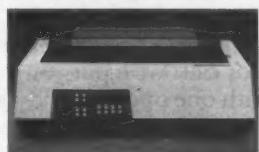
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Product Spotlight/Page Printers

Page description languages help users merge text, graphics

By SHERRY LEE HERRING

Until a few years ago, the most sophisticated page description languages were the text formatting routines used for letter-quality printers and the slightly more complex character printing routines for dot matrix printers. All that had to be specified was a stream of characters, with occasional commands for indents, boldface and underlining and for starting new lines, new paragraphs and new pages.

However, the technology of today's computers allows the layman routinely to generate sophisticated images, drawings and business graphics as well as a wide variety of typefaces and sizes for conveying text — functions traditionally left to a professional page compositor. Modern dot matrix printers and nonimpact printers are now opening the door to exciting possibilities for putting graphics, mixed text and graphics, newspaper- or newsletter-style layouts, engineering and architectural drawings and more on paper.

Page description languages, software for graphically composing images on a page, are a must for anyone who wants to compose combination text and graphics output within one computer — vs. typing text, using a plotter and merging all in a mechanical pasteup environment.

Page description languages vary greatly, and one should be selected based on the intended application environment. Each language fills its niche based on the application, configuration of its system, number of users, desired output and so on.

A page description language requires an all-points-addressable printer — in other words, a dot printer. Being able to place dots in any location on a page to make charts and pictures is integral to the process and hence a fully formed character printer is not desirable.

Also, consider carefully the functions the printer supports: the speed required either in pages per minute or lines per second, the daily or accumulated monthly throughput, the mean time between failure of the printer components and their mean time to repair and the accessories that enhance or limit throughput.

The current trend toward making the language transparent to the user has not been fully achieved, and as such, a page description language's user friendliness remains heavily application dependent. Check with the hardware and software manufacturers from which you will be purchasing to determine the proper language and to ascertain its ease of configuration. Since page description languages are tailored for distinct applications, be sure to select the system's components to optimize efficiency.

Postscript from Adobe Corp. is a general-purpose page description language. Its greatest strength is that it is a device-independent language that allows it to drive low-end laser printers, demand printers and

phototypesetters off the same output code.

Postscript is especially good for office automation and word processing applications and for pages using a variety of fonts and graphics because of its ability to scale and rotate quickly, with a minimum of commands, through the use of outline font representation. It is excellent for making rough drafts of phototypeset manuscripts because it deals with text as if it were a graphic element.

Interpress, developed by Xerox Corp., offers applications in network communications with multiple systems and multiple print stations. It

uses bit-map fonts, where much memory is required, compute time is rapid and the best-quality output may be achieved.

Interpress is ideally suited for multiple-page manuscript preparation, allowing the user to describe a page with mixed text and graphics and offering rapid rework and repagination in a minimum of time. Another page description language, DDL by Imagen Corp., is being specified to address the processing of full documents with high performance and a high degree of functionality.

Reprint from Interleaf Corp. is targeted toward the publishing environment, where the ability to print

merged text and graphics with bit-map fonts produces documents ideal for limited production runs or proofing prior to final phototypesetting and production. It will also find many applications in the engineering workstation marketplace.

Other language software tools are better for plotter-oriented applications. GKS, a Graphics Kernel Set-based description language from GSS Corp., and Tektronix, Inc.'s Plot 10 are especially suited for engineering drawings and computer-aided design, manufacturing and engineering applications because they work from a mathematically based, vector graphics command set. ■

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Herring is manager of corporate communications at Dataproducts Corp., Woodland Hills, Calif., makers of mid-range laser printers.

Product Spotlight/Page Printers

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markets for the foreseeable future.

Graphics are the second attention-grabbing feature. Page printing technology has an intrinsic ability to produce sophisticated graphics, because its line drawing capabilities are limited only by its resolution. Since the printers produce pages dot by dot, it is no more difficult technically to produce a computer-aided design and manufacturing masterpiece than a letter to the editor.

Software and storage hold the keys to graphics capability for page printers. The same powerful raster image processors that drive high-quality graphics terminals must create the graphics image digitally for a page printer to print. Software must translate the bar charts as well as the schematics off a low-resolution screen to an all-points-addressable page.

An 8½- by 11-in. page in 300 dot/in. could consist of more than 8 million dots, each represented by one bit of data. This is the size of the image that must be manipulated by the raster image processor and that must also be stored and transmitted from the host CPU.

Some page printers are fully capable of taking a simple data stream of video input from the host and converting it into a full-page, bit-mapped graphics image for printing. Others sidestep part of the difficulty by limiting either the resolution available for graphics — usually to half that available for text — or the size of the image it will print, so graphics can take up only one-quarter of the page, for example.

Printing a page of graphics slows page printers considerably: An 8 page/min machine might take two minutes for a complex page, or a 100 page/min machine might slow down to 20 or 30 page/min.

Potential buyers should be aware that for both text and graphics, page printers rarely live up to their rated speeds. The pages-per-minute rating accurately reflects the paper speed — how fast the printer can pull a page through its system — but does not include imaging time, the slowest stage, given current technology. Analysts predict it will not always be so, but today users can count on a significant delay for the first page out. Multiple copies of the same page will appear more quickly, but complex pages may never be printed at the rated speed.

Printer buyers may be familiar with this gap between rating and reality from the lines-per-minute and characters-per-second ratings of impact printers. The gap is often compared to automakers' highway mileage ratings for cars — useful for comparison only. "But the rated speeds for page printers is like mileage achieved while your car is coasting down a steep hill," says Jim Minervino, research analyst for the Printer Market Program at International Data Corp. (IDC), a Framingham, Mass.-based market research firm.

Optimized software can absorb some of the processing time of rasterizing a page image. Page description languages compress data transmission by prescribing formulas for each letter sent from the host instead of sending a data stream of simple bits that the printer must compose

into fonts (see story page 49). Similarly, a few languages for graphics composition are available for the more graphics-capable printers.

A central application for the graphics capability of page printers is electronic forms. Most users who require high-volume, letter-quality printing produce some type of forms. With impact technology, preprinted forms fit the need, but page printers can create their own forms (see story page 54). Using the proper software, operators can create and update forms electronically and merge them at print time with variable data. For some users, the saving from eliminating an inventory of preprinted forms alone can cost-justify the investment in a page printer.

Users prize page printers for their relatively quiet operation. There is

nothing silent about page printers, as advertising literature would have buyers believe, but nonimpact devices are certainly quieter than their impact counterparts. A high-end laser model spells relief after the hammering of several 300 line/min line printers. Quiet operation frees page printers to be moved out into the office.

Both low-end and medium-range page printers offer at least some degree of user maintenance. Vendors package the printers' consumables — elements that either run out or wear out — in self-contained cartridges that end users can replace.

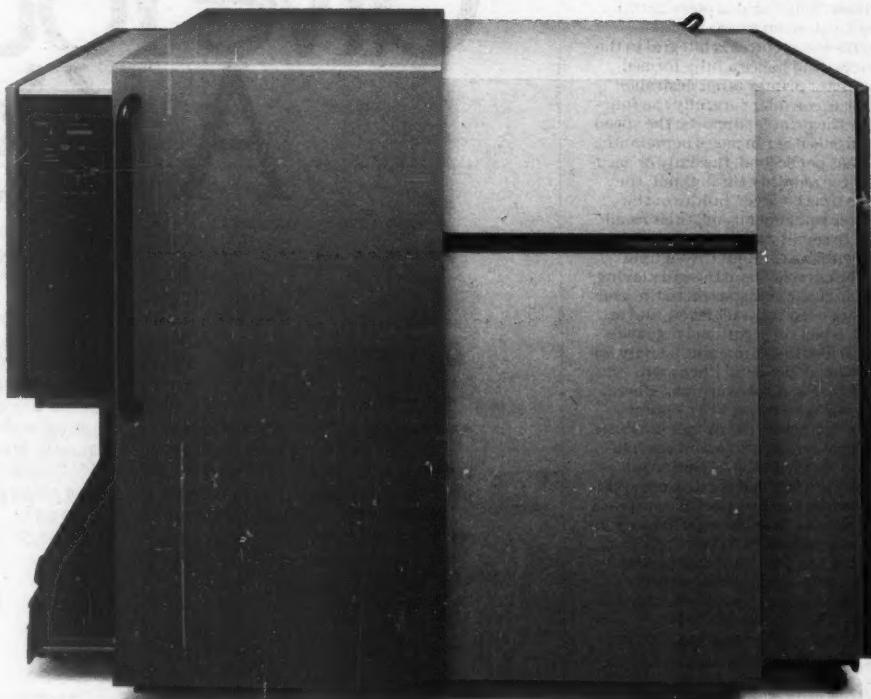
User-serviceable, high-volume printers offer further flexibility advantages in that departments can control their own preventative maintenance schedules according to us-

age. DP need not schedule the departments centrally, and end users can prepare for end-of-the-month rushes or other specific needs.

Vendors strive to make the low-end page printers particularly impervious to office environments. Like copiers, they must withstand dust and heat outside the computer room as well as operators who may not be familiar with controls and switches. By and large, users report no unexpected problems with the reliability of the machines.

"Reliability is outstanding among the users we talked to," reports Minervino, "at least in relation to what users expected. In fact, we didn't find any real problems — just limitations."

Now a laser printer with a price that's fit to print.



Product Spotlight/Page Printers

As Minervino and other analysts point out, one way to ensure that a page printer will break down before its time is to exceed the vendor's recommended printing volume. Rated in pages per month — or in the case of high-speed devices that use fanfold paper, in feet per month — these duty-cycle ratings must be taken seriously by users to avoid downtime or reduced device life.

Duty cycle in some cases forms the basis for classifying a printer as a single-user, workstation device or as a shared printer for use with a local-area network. According to Pesko Associates, an 8 page/min, 3,000 print/mo printer is not a local-area network device. Says Pesko Associates Vice-President Steven Pytka, "It's a question of device life. If the vendor says the printer will

last for 100,000 copies and you run it at 20,000 prints a month, you figure it out — your printer won't last more than five months."

Some users press light-duty printers into service as shared devices to recoup the \$4,000 costs, but even the low-end vendors recommend using a heavier duty model instead.

Several printer vendors such as Konishiroku Photo Industries Co. (Konica) and Ricoh Corp. capitalized on the low volumes of industry leaders Canon U.S.A., Inc. and Hewlett-Packard by offering models in the same price range that print at similar speeds but that boast volumes of 6,000 to 10,000 page/mo.

Paper-handling functions can

keep a light-duty printer from being fully useful for printer sharing as well. Canon-based printers provide only 100-sheet input trays for paper, which at the rated 8 page/min will need to be refilled every 12 minutes. Optimally, low-end printer vendors should provide 250- to 500-sheet capacities for input, a like amount for output and options for more than one input cassette, so users can choose between different paper stocks.

At the high end, users should look for job stacking mechanisms to separate successive jobs plus variable paper sizes, envelopes and transparencies. All the options should be available via software commands and require no operator intervention. For devices whose mission is speedy production, paper handling and capacity should be one of the

buyer's first considerations.

But perhaps the single most important buying consideration rests with software. For high-speed and desktop systems alike, a library of software alone can provide the features and full range of functionality contained in the printer box.

Software requirements may include printer drivers to interface the applications with the printer, print services such as spooling and queuing, forms generation and graphics composition packages, font creation and editing software, page composition programs for cut and paste, paper handling commands for multiple paper input and output trays or communications programs for network transmission and multiple host access.

Even in an office of personal computers, one end user may need the printer for simple text output using Diablo Systems, Inc. Diablo 630 emulation, while a coworker will need to print an elaborate schematic demanding bit-mapped page composition. Even if the printer is equipped for both, software should handle the switch from one mode to the next without operator intervention.

Software availability, especially for the low-end page printers, continues to lag behind hardware availability. New versions of popular applications programs include certain page printers on their print menus, but most users struggle along with older versions of the software that were already installed when the page printer came on board. IDC's Minervino says that despite some vendors' recent efforts, the Lotus Development Corp. 1-2-3 user "still has to use a nightmarish combination of escape codes" to run a low-end page printer.

Users can obtain software for all these page printer functions in one of three places: the page printer vendor, the applications software vendor or one of the growing number of independent software vendors selling page printer software. Failing that, many page printer vendors and software vendors make information available for user companies to write their own interfaces and drivers.

With the full range of features, print volumes and flexibility options available from more than 80 vendors, prospective page printer customers must evaluate their needs before becoming enthralled with the technology. It is a feature-driven market, where sometimes the availability of a heretofore-unheard-of feature will instantly make it seem like a requirement.

IDC's Minervino says, "Go in with your exact application in mind and find out what support is available from the vendor. For instance, IBM is strong in banking, and Xerox knows insurance. But don't just call IBM and Xerox. Call Siemens, Honeywell, Delphax — many others."

Richard Young, project manager for graphics and text architecture planning at Boeing Computer Services Co. in Seattle, helps test printer configurations for many of Boeing Computer's divisions. He advises a systems approach.

"Know what application sets you intend to perform; what the functional requirements are; what the relative complexity of pages will be

Continued on next page

The Datagraphix 6800. Best price/performance \$179,000 can buy.

The 6800 is only about half the price of other high-production laser printers.

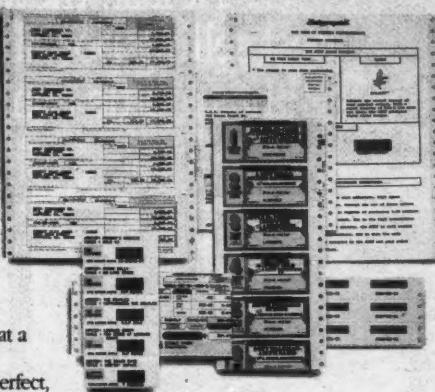
Yet, the 6800 is a full-function laser printer that fits in the space of one high-performance line printer.

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Product Spotlight/Page Printers

Continued from previous page
and so on. Without that," he says, "you're really shooting in the dark."

From there, he advises, determine what interface standards will support these requirements. "Don't be myopic in setting these standards," Young says. "Ask, 'Is it extensible? Is it flexible?'" If several users will share the page printer, define the print services the department will need: print spooling, job queuing, contention management, automatic reset and so on. In a multivendor environment, identify the communications standards that are present in installed equipment so the printer drivers can be specified accurately.

Buyers should consider cost of ownership above cost of acquisition. Cost of ownership, according to Pesko Associates, consists of acquisition costs (including interfaces, paper trays and additional fonts), service and maintenance charges, usage charges if applicable and consumables. Other expenses to include are floor space, electric power and operator time.

Pesko Associates breaks page printers into four groups by operating environment: centralized, satellite, office cluster and workstation.

Centralized environment. At the high end are the printers used in centralized DP environments. These 80+ page/min machines are installed primarily for their raw speed or for applications that require high quality in combination with high volume. Credit card billing is one example, printing government tax forms is another.

Companies with these two specific applications may run 10 or 20 high-end laser printers, each producing more than 100 page/min. Much simpler applications may justify a single such machine within a company. Centralized printers typically print up to 1 million page/mo and operate in a dedicated printer room.

According to IDC, 90% of the page printers that run at 75+ page/min were sold by IBM and Xerox Corp. last year. IBM's Model 3800 and Xerox's 9700 each captured roughly 45% of this fairly stable market. The technology at this level is already quite mature.

For printers that plow through paper as fast as half a second per page, the paper-handling facilities become a major technical issue and end up requiring a substantial amount of the controller's power and functionality.

Xerox page printers emphasize cut-sheet paper handling. Using standard 8½- by 11-in. sheets, Xerox's 9700 boasts dual input and output stackers for continuous operation, even during reloading. Cut sheets afford end users more immediately usable output for some applications without the trouble of bursting and decollating.

On the other hand, IBM's more traditional use of fanfold saves many paper jams. For years, this distinction served as the deciding factor for many customers. Since some applications were served by each, both features remained marketable. Recently, IBM began offering a cut-sheet option, tacitly acknowledging an ongoing need for cut-sheet handling of high-quality printed material.

Another technological difference in some of the centralized printers is their use of a cold fusion technique rather than a heat-fusing station, in which the dry toner is fused to the page. Cold fusion allows the machines to operate at lower temperatures for higher reliability and fewer cooling requirements.

Other than that, high-end models' specifications look a lot like those of the low-end models that emulate them: Resolutions run typically at either 240 by 240 or 300 by 300 dot/in. for text, with a variety of graphics resolutions. Users can mix text and graphics on a page via the appropriate software and can store and download electronic forms for overlay with variable data.

Some of the very high-speed page printers store fonts and data on Win-

chester disks with 5M- to 25M-byte capacities. Many accept electronic forms and font libraries via diskette or magnetic tapes.

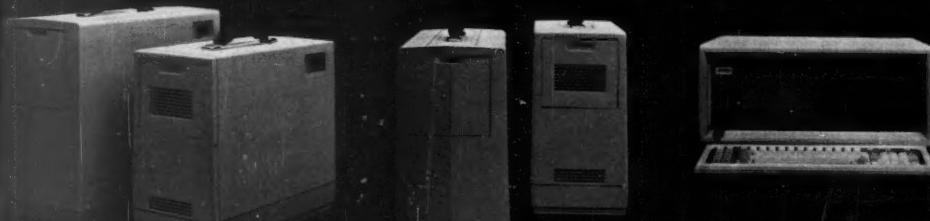
Interestingly enough, at the high end, not all page printers are particularly intelligent. Some older models such as the IBM 3800 and Xerox 9700 lack the raster image processor that would allow them to accept unformatted data streams from the host. According to Boeing Computer Services' Young, these machines accept data on a device level rather than as intelligent nodes. This configuration places the burden of processing back on the host, tying up additional CPU time. Yet the simpler configuration is less expensive, involves fewer components and may

set more flexible limits on page formatting capabilities.

Maintaining a high-speed page printer in many ways resembles owning a mainframe or large minicomputer. Requiring a computer room environment and regularly scheduled preventive maintenance, these high-speed devices must be adjusted and supported to keep printing resolution tuned and downtime at a minimum.

Satellite environment. A slight change at the high end came in price shaving over the past year, as the centralized page printers felt the impact of a new generation of 35 to 80 page/min machines. Classified as satellite printers, these models offer all the functionality of the high-end, centralized machines but at somewhat lower speeds. Satellite page

At last, the world's best-selling portable computer has a little competition.



Product Spotlight/Page Printers

printers are high-volume, production-oriented output devices as well but reside outside the company's data center. Often satellite devices serve as the main production printer at a branch location or within a division of the company. Output is more conveniently located to end users, and the printer may be under the control of departmental staff.

At this level, page printers compete heavily — and successfully — with 300, 600 and 900 line/min line printers. Page printers' quiet operation and high-quality output make them favorites in some DP shops, especially as prices come down. But these models have a long row to hoe; after all, they are up against workhorse line printers that users trust and that are in most cases already paid for.

Xerox is a strong contender in this middle range, with laser models at the 50, 60 and 70 page/min marks. Several vendors, including Xerox, offer page printers in this category based on imaging technology other than lasers; these are the devices that may ultimately give the high-end models a run for their money for sheer price/performance reasons.

Xerox, C. Itoh Electronics, Inc. and Delphax Systems, Inc. each offer printers based on ion deposition technology. Although ion deposition printers generate 240 by 240 dot/in. — the standard density for page printers — many users indicate print quality is slightly lower than the laser equivalent.

Another quality weakness stems from the extreme pressure used in bonding toner to paper with the cold

fusion process of ion deposition printing. This process tends to flatten the finish of the paper, making ordinary bond slightly shiny. Whether these minor differences matter to end users greatly depends on the individual application.

Magnetic printing technology offers yet another option. Bull Peripheriques de France, marketing 50 page/min and 90 page/min models in the U.S., is the current champion of this technique.

These printers offer some of the same advantages over laser printers that ion deposition printers offer: lower power consumption, simpler construction and potentially higher reliability. The magnetic drum is extremely hard — Bull rates its drum

life at 10 million pages. But again, some users do not feel the print output quality matches that of lasers.

Yet magnetic printers can perform one printing task no other nonimpact technology can: The magnetic drum retains a perfect, latent page image and can reproduce it multiple times on demand without re-creation of the image.

Since throughput depends heavily on data transmission and image processing in most cases, the copying capability yields exciting improvements in throughput speed for any application that produces multiple copies. In all, magnetic technology holds great promise, though vendors may not have all the wrinkles ironed out.

These new satellite models represent price/performance breakthroughs while maintaining consistently high volumes, all of which spells good news for many high-volume users.

Office cluster environment. The third operating environment where page printers are used is the office cluster. Here, end users share the device in a distributed processing environment, departmental computer system or local-area network configuration.

Sometimes two to eight users will link up to the printer via a simple sharing device such as a smart switch or manual A-B switch.

Page printers in this category produce anywhere from 10 to 35 page/min, with prices falling into the \$5,000 to \$50,000 range. Office cluster printers exhibit the greatest variety of capabilities and applications of any group.

The 35 page/min laser and ion deposition devices function as production printers on a smaller scale, with an emphasis on paper-handling and collating options. Many 24 page/min printers offer sophisticated bit-mapped graphics or typesetting functions.

Ten and 12 page/min models within the office cluster category offer the high duty cycles that lift them above the single-user, workstation printer classification. Their potentially low price allows vendors to combine features several different ways from a stripped-down, text-only model printing 8 page/min at \$3,495 to a bit-mapped graphics version printing 12 page/min at \$15,800, both based on the Ricoh 4080 laser print engine.

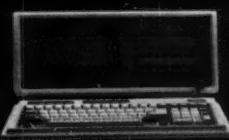
Besides the specialized models, the office cluster category is crowded with offerings from traditional word processing and office automation vendors: Wang Laboratories, Inc., Prime Computer, Inc., Digital Equipment Corp., Data General Corp., NBI, Inc. and Hewlett-Packard all provide page printers to attach to their office systems with the benefit of ready-made compatibility.

Workstation environment. Workstation printers comprise the low-end operating environment group. Here, page printers work one-on-one with end users, so low price is at a premium. Yet the devices are potentially as capable as their office cluster and even satellite counterparts.

The Hewlett-Packard LaserJet is the runaway favorite workstation printer. Based on the ubiquitous Canon LBP-CX print engine, the LaserJet revolutionized low-end laser printing nearly two years ago with

Continued on page 55

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Electronic forms: An alternative to mechanical/optical overlays?

By G. H. SUITER JR.

The ability to create, store and print forms on-line electronically represents the deciding factor for many users switching from line printers to page printers. A variety of high-volume data processing applica-

tions require forms, including producing utility bills, invoice data, general account information, bank statements and check generation.

Interest in using electronic forms has grown steadily since the first products were introduced in the late 1970s. Data center managers cur-

rently using mechanical/optical forms overlays or no forms overlays at all now seriously consider electronic forms implementation.

Electronic forms allow fixed images to be merged with variable print information on demand without operator assistance. Subsequently, electronic forms

serve as an alternative to mechanical/optical forms overlays, which also allow fixed images to be merged with variable print information but require operator intervention to be certain the right form overlay matches the right job.

In shops with 100 or more jobs — each requiring a dif-

ferent form overlay — a significant inventory management problem presents itself. Using electronic forms can greatly reduce or eliminate this problem.

Electronic forms typically load much faster and hence improve the productivity of the printing device. However, the mechanical/optical overlay produces a higher quality image because the photographic process used to create it is not limited by dot addressability.

Electronic forms, on the other hand, are limited in their resolution — usually 240 by 240 or 300 by 300 dot/in. — to the underlying addressability of the laser or ion imaging device.

As a result, some complex logos and very fine lines appear clearer to the critical eye when generated from a mechanical/optical overlay. In many cases, however, this distinction may be too fine for the average end user to concern himself with, and the ease-of-use advantages far outweigh the fine difference in detail.

More And More Printers Are Seeing The Light.

Creating complex forms costs less for photographic overlays because of extended programmer time at the workstation to create the electronic form. But straightforward electronic forms — boxes and simple graphics — may cost less to create than photographic overlays and be indistinguishable from a quality standpoint.

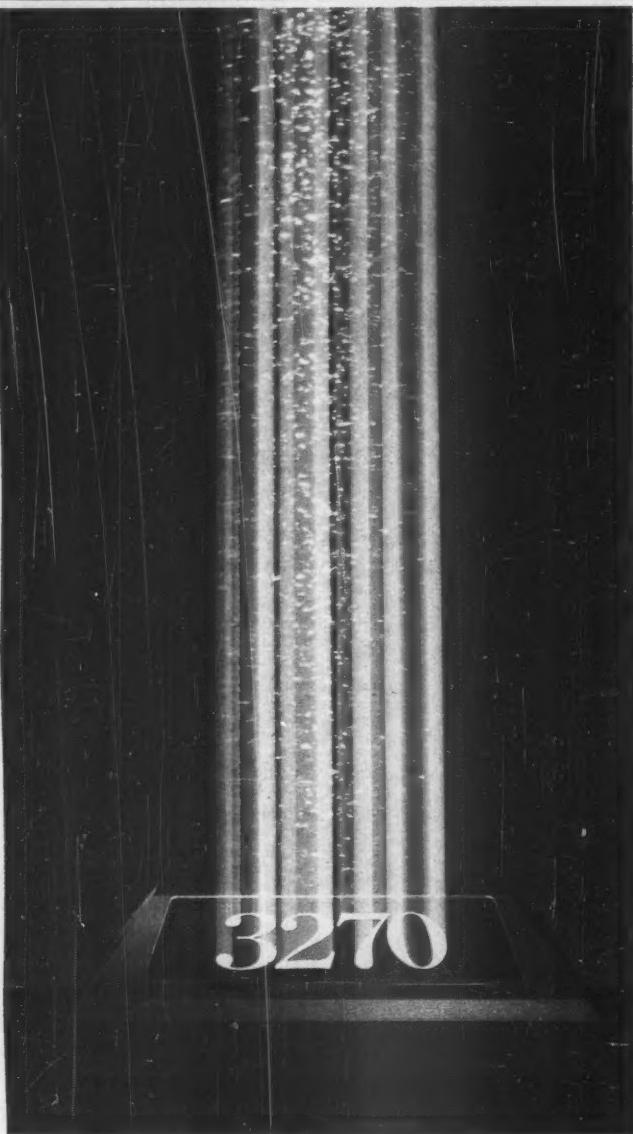
When updating forms, users find electronic form changes much easier to implement, especially if multiple geographic locations are involved. Electronic forms can be updated centrally and transmitted to remote sites, ensuring that each site receives exactly the same — and the latest — forms.

Electronic forms also substitute for preprinted forms that many companies use for invoicing and other mailings.

The big cost saving with electronic forms comes from not having to inventory preprinted forms. Users need not worry about stock depletions, obsolete inventory or inventory carrying costs if they use electronic forms in lieu of preprinted forms.

As the ease of using and implementing electronic forms improves and the cost decreases, more internal and external data processing reports will be highlighted using forms overlays — especially electronic forms.

Suiter is director of planning at San Diego-based Datagraphix, Inc., a vendor of page printers and software.



Avatar enlightens printers made by Adacis, Canon, Centronics, Dataproducts, Datavision, Diablo/Quate, Digital Equipment Corporation, Epson, Florida Data, Fujitsu, Gemini, Genicom, Hewlett-Packard, NEC, Olivetti, Printomatic, Texas Instruments, and others.



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its low price and desktop size. Many, many vendors followed HP's lead.

At this level, the print engines are commodities: The Canon LBP-CX and the Hitachi Ltd., Ricoh and Kentek Information Systems, Inc. engines all turn up inside many resellers' boxes. Vendors choose a print engine and vary the optional features, software and control electronics to create a full product line.

Vendors can keep end-user prices down in different ways. One route cuts down on intelligence for page formatting, sticking to either text-only Diablo 630 emulation or a limited-graphics mode emulating the Epson America, Inc. FX-80 or the IBM Graphics Printer. Many printers, including the original low-end best-seller, the LaserJet, offer the limited functionality.

Configured this way, page printers retain the speed, quiet operation and print quality of laser technology while greatly reducing memory and imaging software requirements—and flexibility. But users do experience fewer difficulties in finding ready-made printer drivers for these emulating page printers.

Another route to cost-justifiable single-user page printers cuts down on control electronics by limiting print speed to 4 or 6 page/min. A single user may never need speeds higher than 4 page/min, and vendors can cut costs significantly with easier paper-handling tasks and slower image-processing requirements.

Right now, the only page printer shipping to end users priced at less than \$2,000 is the 6 page/min Kiss from QMS. Based on the 8 page/min Canon LBP-CX engine, the QMS Kiss shocked the printer community last November. Analysts had long held out \$2,000 as an important price threshold, below which page printers would become much more of a mass-market product.

Other applications call for greater functionality even for a single user. Models are available for single-user bit-mapped graphics, including electronic forms and semi-professional desktop publishing capabilities. The Apple LaserWriter can be considered in this context, although some companies use it in office clusters with a small local-area or printer-sharing network.

Most printers in both the workstation and office cluster categories rely on laser technology, but a few models appeared in 1985 using an LED array as the light source for the electrophotographic process. LED arrays do not require the complex focusing lenses of laser imaging and were originally promoted as a cost-saving technology. In fact, the simpler technology costs the same but proves to be sturdier.

Page printers face off against inkjet and thermal printers in the non-impact world. Both of these technologies offer quiet, nonimpact operation, and though neither can match the page printers for speed, each holds a certain fascination.

Thermal printing, and lately thermal transfer, has gotten away from the peculiar paper that was once required on all models. IBM's Quietwriter, for example, prints on plain paper for correspondence. It falls short of letter quality, but at \$1,395 it also falls short of laser

printing prices. And thermal printer technology has been successfully miniaturized for the ultimate in flexible applications: battery-powered portables.

Ink-jet printing technology has it overcome hurdles, particularly in unclogging and controlling ink flow. Now Diconix, Inc.'s Dijit 1 pushes price/performance further toward competing with page printers, printing 300 dot/in. text at 20 page/min and selling for just \$12,000.

Ink-jet printing's real charm lies in its color capability. But although ink-jet printers still produce the only elaborate color printing in the market, the jury is still out on how much demand there is in a business envi-

ronment for color printing.

The future of page printing will bring ever-more-sophisticated paper-handling functions, including facilities for envelopes, transparencies, variable paper sizes or weights and finishing systems. With the advent of dedicated graphics processors in the controllers, graphics production will become feasible on an in-house, office cluster level as never before. Printer controllers will offload imaging and storage more and more from hosts, speeding system throughput.

"Improved software is important for making gains in flexibility," says Boeing Computer's Young. "But it is the raster image processors that are key for page printers. In the future, I expect to see parallel, pipelined processing and dual-ported memory in these printers."

Also, it would be a perfect application for reduced instruction set computer processors, since you can predict exactly what instructions will be used."

Young says these architectures would be appropriate for any speed print engine, foreshadowing a day when an end user's Intel Corp. 80186-based personal computer will be accompanied by a far more powerful, pipelined printer.

Increasingly sophisticated page printers will never eliminate the demand for line printers. Industry watchers observe that major vendors have not slowed their introductions of new impact models recently. But on the other hand, neither will increasingly sophisticated office automation ever eliminate the need for paper—crisply, quietly printed.

MILTOPE's Non-Impact Printer Brings You More Than Top Performance ... It Improves Your "IMAGE"

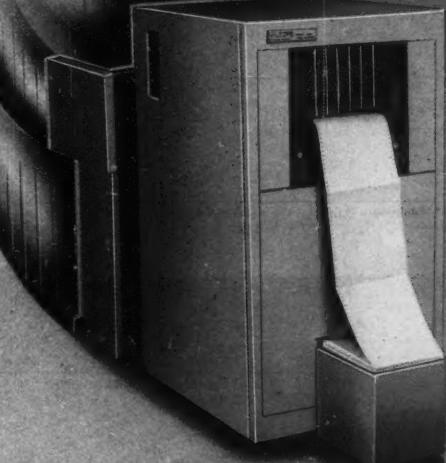
90 Pages Per-Minute ... High Resolution ... Logo and Graphic Forms Generation ... IBM 3211 & Data Products I/O Compatible

Miltope's 3801 continuous form or cut sheet page printer eliminates time-consuming bottlenecks by combining speed, reliability and versatility in an electronic printing system that fully emulates the IBM 3211. The plug-to-ping compatible printer integrates into your system with little or no conversion and no application changes. It's that simple . . . no productivity is lost!

SUPERIOR IMAGE QUALITY—Using a 240 × 240 dot per inch matrix, Miltope's 3801 ion deposition printer provides letter-quality alphanumeric printout plus high resolution graphics for signatures, logos and form generation.

HIGH-PRODUCTIVITY—At 90 pages per minute, the 3801 prints in excess of 10,000 lines per minute in a 2-up format. Whether your computer is a big IBM mainframe or a super-minicomputer DEC, Prime, HP, Novell, or whatever, the capability to output more than one-million pages per month dramatically improves job turnaround time and quickly eliminates major printing backlog.

VERSATILITY—The variety of characters available with electronic printing far surpasses any impact printer. Two fixed and two variable 128 character sets are continuously "on-line," host or operator selectable in either portrait or landscape format. The 3801 prints sharply on continuous form or plain bond paper, colored stock, preprinted forms, gummed labels and other surfaces where laser printers often fail.



EASE OF INTEGRATION—The simplicity of ion deposition technology minimizes maintenance and maximizes uptime. Both models, cut sheet or continuous form, are compact. Heat dissipation (5400 Btu/hr.) and power consumption (2470 watts) are extremely low when compared with hi-speed impact or laser printers.

HASP COMPATIBILITY—For remote site printer applications, the 3801 can be modem connected to the data line of the central computer and programmed as a HASP workstation.

Electronic printing is "clean" and "efficient." Programmatic font selection eliminates the repetitive changes of the print-chain module . . . toner imaging eliminates messy ribbon replacement . . . straight line paper path virtually eliminates paper jams and misfeeds.

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Product Spotlight/Page Printers

PAGE PRINTERS

Vendor/Product	Print Speed (page/min)	Printing Technology	Resolution (dot/in.)	Number of Fonts per Page	Duty Cycle (page/mo)	Paper Handling Features Included in Price	Paper Handling Options	Print Engine	Printer Applications	Price
Advanced Technologies International, Inc. 2041 Mission College Blvd. Santa Clara, Calif. 95054	8	Laser	300 by 300	16	3,000	150-sheet input	Triple-bin sheet/envelope feeder	Canon LBP-CX	For use with IBM Displaywriter for multiple fonts, forms creation and signatures; emulates IBM 5218	\$4,495
Laserprinter 870										
Advanced Technologies International	8	Laser	300 by 300	Multiple	5,000 to 10,000	Not available	Not available	Ricoh 4080	Heavy-duty printer emulates Diablo 630, Epson FX-80, Hewlett-Packard Laserjet	\$4,495
Laserprinter 880										
Advanced Technologies International	26	Laser	300 by 300	16	50,000	Dual-input cut-sheet feeder for 750 sheets	1,500-sheet bin, collator	Dataproducts LZR-2600	Supports IBM, DEC, Wang systems; emulates Epson FX-80, NEC Spinwriter, Xerox 2700, Calcomp, Diablo 630; supports Interleaf languages and Adobe Postscript	\$11,400
Laserprint 2670										
American Computer Hardware Corp. 2205 S. Wright St. Santa Ana, Calif. 92705	30	Ion deposition	300 by 300	Variable	150,000	1,000-sheet input	Job jog, sorter and 2,000-page in-feed elevator	Delphax/C.Itoh 53000 engine	General-purpose data processing printer	\$12,995
CIE 3000										
American Computer Hardware	60	Ion deposition	240 by 240	Variable	1 million to 2 million	Cut-sheet machine with option of several paper paths	Nonultraviolet coating/drying device, positive stacking	Delphax 2460	Suited for labels application, graphics, high-volume billing applications	Not available
Fast 5000 Model 5100										
American Computer Hardware	90	Ion deposition	240 by 240	Variable	1 million to 2 million	Pin feed continuous with refold device for output	Nonultraviolet coating/drying device, roll-to-roll paper	Delphax 2460	Can be custom designed, applicable for data processing applications as well as specialty situations such as attaching to a web press	Not available
Fast 5000 Model 5600										
Apple Computer, Inc. 20525 Mariani Ave. Cupertino, Calif. 95014	8	Laser	300 by 300	Multiple	3,000	100-cut-sheet input	Not available	Canon LBP-CX	For word processing and desktop publishing, uses Adobe Postscript, IBM Personal Computer compatible	\$5,999
Laserwriter										
Apple Computer	8	Laser	300 by 300	Multiple	3,000	100-cut-sheet input	Not available	Canon LBP-CX	For desktop publishing with Apple Macintosh; 11 font families	\$6,798
Laserwriter Plus										
Bell Peripherals Corp. 766 San Aliso Ave. Sunnyvale, Calif. 94086	90	Magnetic	240 by 240	8	500,000	Continuous forms input	Not available	Proprietary	High-volume data processing	\$79,500
MP 6090										
Burroughs Corp. One Burroughs Place Detroit, Mich. 48232	8	Laser	300 by 300	8	6,000	250-sheet cassette	Not available	Ricoh 4080	General-purpose printer for office-applications, emulates Diablo 630	\$3,395
AP 9208										
Canon U.S.A., Inc. One Canon Plaza Lake Success, N.Y. 11042	8	Laser	300 by 300	16	3,000	100-sheet paper cassette, manual feed	High-capacity outlet port	Canon LBP-CX	General-purpose printer for word processing, data processing, spreadsheet, business graphics	\$3,000
Canon LBP-B A1										
Canon U.S.A.	8	Laser	300 by 300	16	3,000	100-sheet paper cassette, manual feed	High-capacity outlet port	Canon LBP-CX	Desktop publishing, full graphics (raster, vector)	\$4,300
Canon LBP-B A2										
CIE Terminals, Inc. 2505 McCabe Way Irvine, Calif. 92714	10	Laser	300 by 300	16	15,000	Dual-input tray, 250 sheets	Alternate size tray	Proprietary	Compatible with Epson FX-80 and Diablo 630	\$3,495
Lips 10										
C. Itoh Electronics, Inc./ Delphax Systems, Inc. 2515 McCabe Way Irvine, Calif. 92713	30 or 45	Ion deposition	300 by 300	1	150,000	2,500-sheet feeder	2,000-sheet elevator	Proprietary	Data processing, mass mailing, financial statements	\$12,995 or \$15,450
CIE 3000										

The companies included in the chart responded to a recent written survey conducted by Computerworld. Vendor list was furnished by GMI Information Services, an on-line data base supplier based in Lexington, Mass.

Source: CW Chart compiled by Amy Sommersfeld and Christie Stars

Product Spotlight/Page Printers

Product Spotlight/Page Printers

PAGE PRINTERS

Vendor/Product	Print Speed (page/min.)	Printing Technology	Resolution (dot/in.)	Number of Fonts per Page	Duty Cycle (page/mo.)	Paper Handling Features Included	Paper Handling Options	Print Engine	Printer Applications	Price
Dataproducts LZR-2610	26	Laser	300 by 300	1	30,000	Cut sheet, dual-bin feeder, 500-sheet capacity	1,500-sheet input, sorter	Toshiba 7000 series	Tabletop printer for data processing, direct mail printing, accounting, spreadsheets, label printing	\$12,900
Dataproducts LZR-2630	26	Laser	300 by 300	Unlimited	30,000	Dual-bin feeder, 500-sheet input	1,500-sheet input, sorter	Toshiba 7000 series	Data processing, word processing, spreadsheets, label printing, transparencies	\$14,900
Dataproducts 2655	26	Laser	300 by 300	Unlimited	30,000	Dual-bin feeder, 500-sheet input	1,500-sheet input, sorter/collator	Toshiba 7000 series	Computer-aided publishing, typeset proofing, graphic arts, business graphics, form/text merge	\$17,900 to \$19,900
Dataproducts 2665	26	Laser	300 by 300	Unlimited	30,000	Dual-bin feeder, 500-sheet input	1,500-sheet input, sorter/collator	Toshiba 7000 series	Computer-aided publishing, typeset proofing, graphic arts, business graphics; runs Adobe Postscript	\$22,900
Datasouth Computer Corp. P.O. Box 240947 Charlotte, N.C. 28224	8	LED array	300 by 300	32	5,000	250-sheet input	Second 250-sheet hopper	NEC LC8000	General-purpose office printer, prints electronic forms	\$2,995
PageWriter 8										
Delphax Systems, Inc. 35 Pacella Park Drive Randolph, Mass. 02368	30	Ion deposition	300 by 300 or 240 by 240	4	150,000	500-sheet input	2,000-sheet elevator	Proprietary	Lines, forms or graphics; forms generation, directional or landscape, duplex printing	\$12,000
S3000										
Delphax Systems S4500	45	Ion deposition	240 by 240 or 300 by 300	4	150,000	500-sheet input	2,000-sheet elevator	Proprietary	Lines, forms or graphics; forms generation, directional or landscape, duplex printing	\$14,000
Delphax Systems S6000	60	Ion deposition	240 by 240	4	1 million	1,500-sheet input	Not available	Proprietary	General-purpose printer, directional or landscape, duplex printing, eight fonts standard	\$70,000
Delphax Systems S6000-2	75	Ion deposition	240 by 240	26	1 million	1,500-sheet input	Not available	Proprietary	Directional or landscape, duplex printing, eight fonts standard	\$72,000
Digital Equipment Corp. 129 Parker St. Maynard, Mass. 01754	8	Laser	300 by 300	30	3,000 to 4,000	250-sheet input tray	Not available	Ricoh	Desktop laser printer for team, departmental or personal printing; business graphics	\$3,495
LN03										
Facit, Inc. 9 Executive Park Drive Merrimack, N.H. 03054	12	Laser	300 by 300	16	20,000	250-sheet bin	Not available	Ricoh	For word processing, correspondence, business graphics, bar codes	\$9,500
Opus 1										
General Business Technology, Inc. 1891 McGaw Ave. Irvine, Calif. 92714	8	Laser	300 by 300	Multiple	Not available	100 cut sheets	Dual-bin sheet feeder	Canon LBP-CX	Letters, reports, forms overlay, font storage	\$4,995
6630 XP										
General Business Technology S600 XP	12	Laser	300 by 300	Multiple	Not available	500 cut sheets	Not available	Xerox 2700	Letters, reports, forms	\$16,495
General Business Technology S640 XP	30	Ion deposition	300 by 300	1	Not available	1,000 cut sheets	1,500-sheet input feeder, collector	Delphax	Line printing applications	\$14,995
General Business Technology S610 XP	60	Ion deposition	240 by 240	Multiple	Not available	2,000 cut sheets	Not available	Delphax	Letters and reports	\$61,300

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Vendor/Product	Print Speed (pages/min)	Printing Technology	Resolution (dot/in.)	Number of Fonts per Page	Duty Cycle (page/mo.)	Paper Handling Features Included in Price	Paper Handling Options	Print Engine	Printer Applications	Price
Genicom Corp. 1 Genicom Drive Waynesboro, Va. 22980 5010	10	Laser	300 by 300	4	5,000	200-sheet cassette	50-sheet tray	Hitachi	Emulates Diablo 630, HP LaserJet, IBM graphics printer; full page bit-image graphics optional	\$2,995
GTC Technologies, Inc. 216 W. Florence Ave. Inglewood, Calif. 90301	8	Laser	300 by 300	8	10,000	100-sheet input cassette	300-page output tray, collator	Canon LBP-CX	General-purpose printer available in two-user and five-user versions	\$2,995 to \$3,745
Blaser										
Hatra Computers & Communications Industries, Inc. 1151 S. Eddie Allen Road Melbourne, Fla. 32901 Graftex 3024	24	Laser	300 by 300	60	70,000	Combined input paper tray capacities of 2,000 sheets, offset stacking and collating	Spooling, software duplexing and multiple copies	Xerox XP-24	General-purpose printer, can be used for remote printing	\$21,500
Hewlett-Packard Co. 11311 Chinden Blvd. Boise, Idaho 83714	8	Laser	300 by 300	8	Not available	100-sheet paper feeder	Alternate-size trays	Canon LBP-CX	Word processing, spreadsheets	\$2,995
LaserJet										
Hewlett-Packard LaserJet Plus	8	Laser	300 by 300	16	Not available	100-sheet paper feeder	Alternate-size trays	Canon LBP-CX	General-purpose printer for environments with graphics or electronic forms needs	\$3,995
Hewlett-Packard LaserJet 500 Plus	8	Laser	300 by 300	16	Not available	500 sheets, job offset, manual paper feeder	Alternate-size trays	Canon LBP-CX	Suited for use in a shared or local-area network environment or as a secretarial workstation	\$4,995
Hewlett-Packard HP 2688A	12	Laser	300 by 300	32	Not available	Cut sheet, simplex	Alternate-size trays	Ricoh LP4120	General-purpose printer for use with HP 3000 computer systems	\$29,950
Holoscan Corp. 2 Olsen Ave. Edison, N.J. 08820 Holoscan 28	28	Laser	300 by 300	Unlimited	20,000 to 30,000	Two paper cassettes	1,000-sheet feeder, Proprietary 2,000-sheet feeder		Holographic imaging technology, data processing, office automation, scientific and engineering applications and electronic publishing	\$14,500
Honeywell Information Systems, Inc. 65 Walnut St. Wellesley, Mass. 02181 Page Processing System III	90	Ion deposition	240 by 240	4	700,000 to 1 million	Perforates, punches, cuts to size, collates and stacks, electronic forms and fonts standard, dynamic forms selection standard	Additional stackers	Delphax 2090	General-purpose printer aimed at high-volume data processing shops	\$280,000
Honeywell Information Systems Page Processing System II	140 to 210	Dielectric	200 by 200	4	1.5 million to 4 million	Perforates, punches, cuts to size, collates and stacks	Electronic forms and fonts package, second toner station, stackers	Proprietary	General-purpose printer aimed at high-volume data processing shops	\$265,000
IBM Contact local IBM marketing representative 3812	12	LED array	240 by 240	Multiple	12,000 to 18,000	Primary input — 550 sheets, alternate cassette — 250 sheets	Additional cassette	Kentek	General-purpose printer, eight-user sharing card optional	\$7,500
IBM 3820	20	Laser	240 by 240	32	70,000	Primary input — 1,100 sheets, alternate cassette — 250 sheets	Not available	Proprietary	Graphics, text, forms	\$30,550
IBM 6670	36	Laser	240 by 240	5	50,000	Two input trays, primary — 2,100 sheets, alternate — 600 sheets	Not available	Proprietary	General-purpose printer	\$39,000
IBM 3800 Model 1	215	Laser	180 by 144	4	1.6 million feet	15- to 24-ft fanfold, simplex only	Burster, trimmer, stacker	Proprietary	General-purpose printer	\$215,000
IBM 3800 Model 3	215	Laser	240 by 240	64	1.69 million feet	15- to 24-ft fanfold, simplex only	Burster, trimmer, stacker	Proprietary	General-purpose printer	\$330,750
Imagen Corp. 2650 San Tomas Expy. Santa Clara, Calif. 95052 Image Station	8	Laser	300 by 300	Unlimited	5,000	Cut sheets, envelopes, transparencies	Not available	Canon LBP-CX	Merges text and graphics; serial, parallel and Ethernet interfaces	\$5,950 to \$7,200

Product Spotlight/Page Printers

PAGE PRINTERS

Vendor/Product	Print Speed (page/min.)	Print Tech.	Resolution (dots/in.)	Number of Fonts per Page	Duty Cycle (page/mo.)	Paper Handling Features Included in Price	Paper Handling Options	Print Engine	Print Applications	Price
Imagen 8/300	8	Laser	300 by 300	Unlimited	5,000	Envelopes, transparencies, 100-sheet input	Not available	Canon LBP-CX	Merges text and graphics; multiuser print station; serial, parallel and Ethernet interfaces	\$8,950
Imagen 12/300	12	Laser	300 by 300	Unlimited	15,000	Cut sheets, envelopes, transparencies	Electronic page collation, page order reversal, multiple copies facility, automatic jam recovery	Ricoh	Merges text and graphics; serial, parallel and Ethernet interfaces	\$15,800
Imagen 24/300	24	Laser	300 by 300	Unlimited	40,000	Three input trays for 2,000 sheets, 500-sheet output tray with offset stacker	Not available	Xerox XP-24	Computer-aided design and engineering, technical publishing and graphic arts markets; serial, parallel and Ethernet interfaces	\$29,950
Interface Systems, Inc. 5855 Interface Drive Ann Arbor, Mich. 48103	8	LED array	300 by 300	6	5,000	250-sheet input bins collate sheets automatically, prints on paper or transparencies	Second sheet feeder	Proprietary	General-purpose printer for IBM 3270 or System/34, 36 or 38 users; supports IBM Script, Professional Office System, Displaywrite and ETC/Email	\$4,495
ISI Laser6										
KEL, Inc. 400 W. Cummings Park Woburn, Mass. 01801	20	Laser	300 by 300	Unlimited	50,000	250-sheet cassette	2,000-sheet hopper; face-down dual stacker with offset capability, 250 sheets each; duplex print option	Canon LBP-20	General-purpose printer, RS-232 and Centronics I/O standard; IBM 3270 coaxial, IBM System/34, 36, 38 twin axial and Data Products optional	\$14,950
M5311										
Kentek Information Systems, Inc. 6 Pearl Court Allendale, N.J. 07401	12	LED array	240 by 240	Multiple	24,000	Dual input cassettes (550, 250 sheets), offset jogger	Envelope cassette	Proprietary	For use in word processing, data processing, design and accounting applications	\$7,995
K-2										
Konishiroku Photo Industries Co. TMC Co. P.O. Box 423 Wayne, Pa. 19087	10	Laser	300 by 300	8	10,000	250-sheet tray	Additional paper trays	Proprietary	General-purpose page printer for single workstation, can also be shared by multistations in a shared cluster or a satellite information system	\$3,495
Konica LP-3010										
Laserlink Systems, Inc. 315 Riviera Drive San Rafael, Calif. 94901	8	Laser	300 by 300	16	12,000	Not available	Single- and triple-bin automatic feeders, envelope and label capabilities, 10-tray automatic mailbox	Canon LBP-CX	General-purpose printer for IBM System/34, 36 and 38 environment; IBM PC Network version available	\$3,790
Twinax-Jet										
Laserlink Systems	8	Laser	300 by 300	124	12,000	Not available	Single- and triple-bin automatic feeders, envelope and label capabilities, 10-tray automatic mailbox	Canon LBP-CX	General-purpose printer for IBM System/34, 36 and 38 environment; IBM PC Network version available	\$4,790
Twinax-Jet Plus										
Mannesmann Tally Corp. 8301 S. 180th St. Kent, Wash. 98032	10	Laser	300 by 300	6	5,000	Dual-bin paper input (250 sheets each)	Job separation device for multiple user applications	Kyocera	Add-on options of expanded memory, shared I/O device (handles up to four users) and expanded font capabilities	\$3,500
MT910										
Megacom, Inc. 3925 Coconut Palm Drive Tampa, Fla. 33619	30 to 120	Laser	240 by 240	Multiple	1 million	Cut sheets	Not available	Burroughs	Printer control module manages up to four input devices or data networks and up to four output devices	\$125,000
Megaprint										
NBI, Inc. 3450 Mitchell Lane Boulder, Colo. 80301	10	Laser	300 by 300	4	5,000	Single bin — 250 sheets	Additional paper trays	Xerox XP-10E	General-purpose printer	\$6,495
Model 10										
NBI Model 12	12	Laser	300 by 300	4	15,000	Dual bin — 250 sheets per bin	Not available	Xerox XP-12E	General-purpose printer	\$17,500

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Vendor/Product	Print Speed (pages/min.)	Printing Technology	Resolution (dpi/in.)	Number of Fonts per Page	Dot-Cycle (pages/mo.)	Paper Handling Features Included	Paper Handling Options	Print Engine	Printer Applications	Price
Telefile Computer Products T2463 Laser Printer	12	Laser	300 by 300	Not available	Not available	Dual input, 250 sheets each	Alternate-size tray	Xerox 2700	Graphics, IBM 2770, 2780, 3780 emulation	\$19,995
Telefile Computer Products T7467LZ	24	Laser	300 by 300	16	Not available	Dual input paper cassettes, output stacker	Not available	Xerox 3700	General-purpose printer	\$39,280
Tempest Technologies, Inc. 11411 Isaac Newton Sq. S., Reston, Va. 22090 LZR5600 series	26	Laser	300 by 300	Unlimited	50,000	Dual cassettes	1,500-sheet power cassette, powered face-down output tray and sorter	Toshiba	Three models: line printer emulation, Diablo 630 emulation, programmable text and graphics emulation	\$19,500
Versatec, Inc. 2710 Walsh Ave., Santa Clara, Calif. 95051 Spectrum	17	Electrostatic	200 by 200	2	5,000 to 10,000	Paper or film	Cut-sheet or continuous paper	Proprietary	General-purpose color or monochrome printer/plotter	\$11,950
Versatec Versatec V-80	Not available	Electrostatic	200 by 200	2	5,000 to 10,000	Paper or film	Cut-sheet or continuous paper	Proprietary	General-purpose monochrome printer/plotter	\$8,950
Wang Laboratories, Inc. One Industrial Ave., Lowell, Mass. 01851 LPS 8	8	Laser	300 by 300	3	3,000	Two-sided copy, 100-sheet capacity	Alternate-size trays	Canon LBP-CX	General-purpose printer, more than 90 fonts	\$5,000
Wang LPS 12	12	Laser	300 by 300	2	15,000	Offset stacker, 250-sheet input tray	Not available	Xerox 2700	General-purpose printer, more than 90 fonts	\$20,000
Wang LIS 12	12	Laser	300 by 300	99	15,000	Offset stacker, dual-cassette input	Not available	Xerox 2700	General-purpose printer features graphics	\$26,000
Wang LIS 24	24	Laser	300 by 300	99	30,000	Offset stacker, two cassettes — 1,500 sheets, 250 sheets	Not available	Xerox XP-24	General-purpose printer features graphics	\$30,000
Xerox Corp. 101 Continental Blvd., El Segundo, Calif. 90245 Model 4045 CP	10	Laser	300 by 300	22	2,000 to 10,000	250 cut sheets	Envelope feed	Proprietary	150 by 150 dot/in. graphics, Diablo 630 and Xerox 2700 II emulation	\$4,995
Xerox Model 2700 II	12	Laser	300 by 300	Multiple	15,000	Dual input, 250 sheets per tray	Not available	Proprietary	Remote print management facility, Xerox forms description language	\$14,495
Xerox Model 3700	24	Laser	300 by 300	16	40,000	2,000-sheet stacker, dual input, 250 cut sheets per tray	Not available	Proprietary	For distributed data processing, includes 10M-byte Winchester 5½-in. floppy drives	\$29,995
Xerox Model 4050	50	Laser	300 by 300	44	750,000	1,000 cut sheets, 500-sheet auxiliary tray	Not available	Proprietary	IBM 3811 or 3211 line printer interface, on-line or off-line operations, Xerox Interpress language	\$140,500
Xerox Model 4060	60	Ion deposition	240 by 240	8	500,000	2,500 cut sheets	Not available	Delphax	Forms description language, print manager	\$70,000
Xerox Model 8700	70	Laser	300 by 300	Multiple	400,000	2,500 cut sheets	500-sheet tray	Proprietary	Two 25M-byte disks, optional magnetic tape unit for off-line printing	\$212,000
Xerox Model 9700	120	Laser	300 by 300	Multiple	900,000	2,500-sheet stacker, labels, cards	Expanded tray	Proprietary	Duplex printing for IBM 360, 370, optional graphics input station	\$390,000



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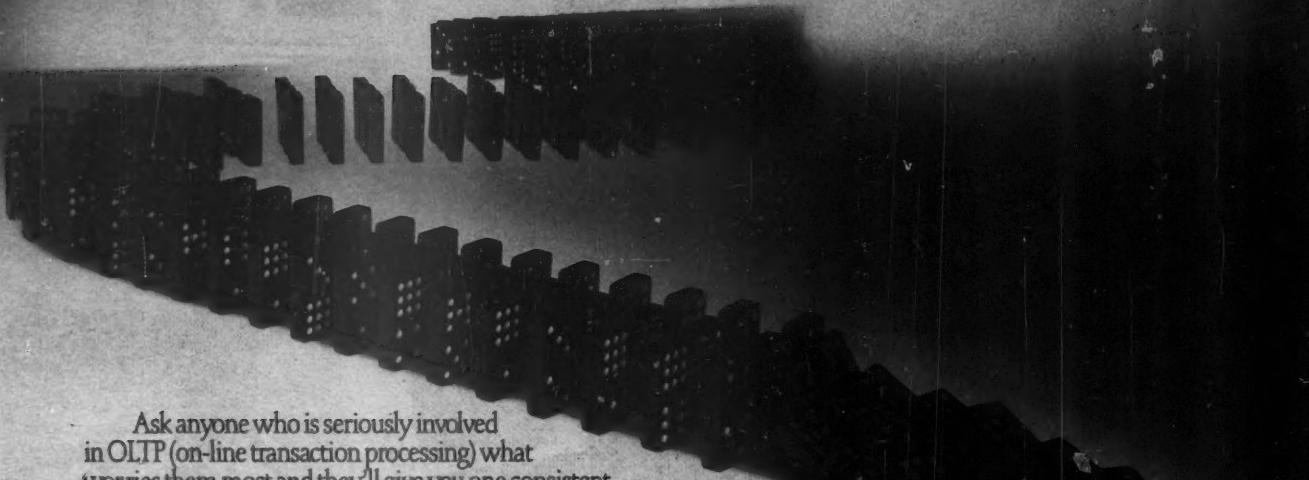
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Ask anyone who is seriously involved in OLTP (on-line transaction processing) what worries them most and they'll give you one consistent answer, "system failure." That's when the domino theory goes to work. Because when the computer goes down, your whole operation goes down with it.

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In Depth

Million-dollar graphics



CW PHOTO BY O'CONNELL/LADOUCEUR

Visual information systems turn data bases into graphic information. Not only can graphics applications save corporate time and money, but they also are another step toward converting data processing into a strategic and competitive weapon.

By ALAN PALLER

What computer application offers companies a million dollars in savings, improved sales effectiveness and happier customers?

What computer application offers senior management immediate access to key performance indicators, allowing them to reinforce outstanding performance quickly and anticipate weak performance before it becomes critical?

What computer application amplifies the value of data, giving senior management a reason to increase investment in information systems rather than reduce the funds being poured into data processing?

One answer is the single technology known as "visual information systems," which combines computer graphics with data bases. Your organization may be one of the plurality that has discovered computer graphics, but only from a "pretty pictures" view. Yet some major organizations have gone beyond pretty pictures.

The case studies presented in this article highlight an important trend toward visual information systems, which turn data bases into information. The case stories reflect the fact that, to the people who receive information, time is money. By providing visual information rather than traditional printouts, these organizations can convert their data processing departments into strategic and competitive weapons.

Paller is president of AUI Data Graphics in Washington, D.C., and a director of the National Computer Graphics Association (NCGA). NCGA's Computer Graphics '86 conference, May 11-15 in Anaheim, Calif., will highlight several of the applications mentioned here.

tive weapons.

The applications performed by these companies are not unique, but they are uncommon. Too few organizations consider information processing departments to be strategic weapons. Too many think of data processing as a technology that is important but costs too much money. In contrast, the organizations described here see data processing as a tool that can help their companies gain market share, improve executive effectiveness and reduce costs.

In most cases, I name the organizations that have implemented strategic applications. In a few cases, however, I provide a pseudonym. The companies that have chosen to remain anonymous are no less successful than those willing to be identified. To the contrary, some have found their visual information systems so strategic that they are not willing to allow their competitors to know exactly what they are doing with the technology.

The General Motors Corp. Treasurer's Office provides a case in point. *Business Week* magazine reported that senior officials in GM's treasurer's office said, "We consider our financial decision support system [which is a visual information system] to be so strategic that we will not discuss it publicly."

Leadership role

First Chicago Corp. is one of America's top 10 banks in terms of assets and is the leading bank in the Midwest. The bank is also a major player in commercial banking globally. Despite intense competitive forces, First Chicago continues to excel and maintain its leadership role.

The bank has used computer graphics for five years, in an application called "Performance Measurement Graphics." This visual information system focuses on improving the

quality and productivity of the bank's services to clients. Weekly, it tracks more than 700 performance indicators that customers consider important.

To initiate the system, each business unit in the bank identified the indicators that measured how customers perceived the bank's timeliness, accuracy and customer service responsiveness. For each indicator, the bank managers established a goal and a level of minimum acceptable performance. Then they designed charts to gauge each business unit's performance according to the indicators.

Each of the charts that show outstanding performance (levels above goal), problems (levels below minimum acceptable performance) or a substantial trend toward either of those, are displayed and discussed at

"Because a staff meeting with charts makes success so visible, the charted goals have become a point of pride and a source of competition among the business unit managers."

weekly senior management meetings. Because a staff meeting with charts makes success so visible, the charted goals have become a point of pride and a source of competition among the business unit managers. More important, the charts highlight early warnings when something is amiss, so corrective action can be taken quickly.

One example of corrective action occurred when the business unit

manager for First Chicago's money transfer unit saw on one of the charts that the response time for telephone-initiated money transfer requests was on the increase. The manager, having isolated the problem, analyzed it, found where peak period backups were occurring and shifted staff resources to meet the peak demand. As a result, performance improved beyond its previous high levels.

The bottom line on First Chicago's performance measurement charts is a significant reduction in the cost of cash management services. The bank estimates that performance management helped cut the cost of error correction from 21% to 10% of total production costs, resulting in savings of more than \$1 million. Reduced costs allowed the bank to hold the price of services relatively unchanged for several years, giving First Chicago a better competitive market position.

Charts form the conveyor belt along which performance measurement is carried. The program improved the bank's competitive position in one other way. By reducing the number of errors that were made, the bank lowered the overall cost to its customers of doing business with First Chicago. Performance improvements resulted in a decline in the customers' internal expenses for correcting errors. By setting one of the highest standards for accuracy in the industry, First Chicago has become even harder to beat.

All this quality improvement, however, would be useless if the customers were not aware of the progress the bank had made.

First Chicago solved this problem by publishing a Quality Performance chart book for its customers, showing charts of approximately 100 of the most important indicators, along with brief descriptions of the progress made in each indicator. The Quality Performance chart book turned into one of the bank's most powerful marketing tools because it makes the bank's commitment to quality visible.

Keen eye

Hardees Restaurants' flourishing fast-food empire is expected to achieve sales of \$2.2 billion in 1986. This success is a product of the company's keen eye on the competition and close watch on the public's appetite. Computer graphics at Hardees headquarters is considered a crucial analysis tool when deciding on substantial investments such as building new outlets or introducing a new hamburger.

Before Hardees launched a recent successful expansion program in a southern state, the company divided the state into designated market areas. Color-coded graphics showed the market penetration of each competitor, tracking expansion or reduction of hundreds of outlets in various areas. Hardees' development department used the information to study the reasons underlying competitors' moves and to target the state's most promising locations for Hardees outlets.

For the average fast-food customer, forgoing a hamburger in December is an economic decision involving a couple of dollars. For Hardees' 850 company stores and 1,600 franchises, maintaining correct inventory levels for summer rushes and slower winter months adds up to millions of dollars and tons of food.

Before visual reporting, printouts showed product managers the sales numbers. Tracking sales with charts, however, shows seasonal sales cycles and the impact of product advertising, so Hardees can invest in the right amount of inventory and keep top of which products are doing well.

Presenting information in visual format became the expected

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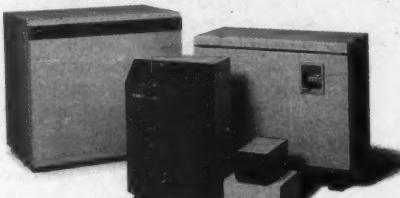
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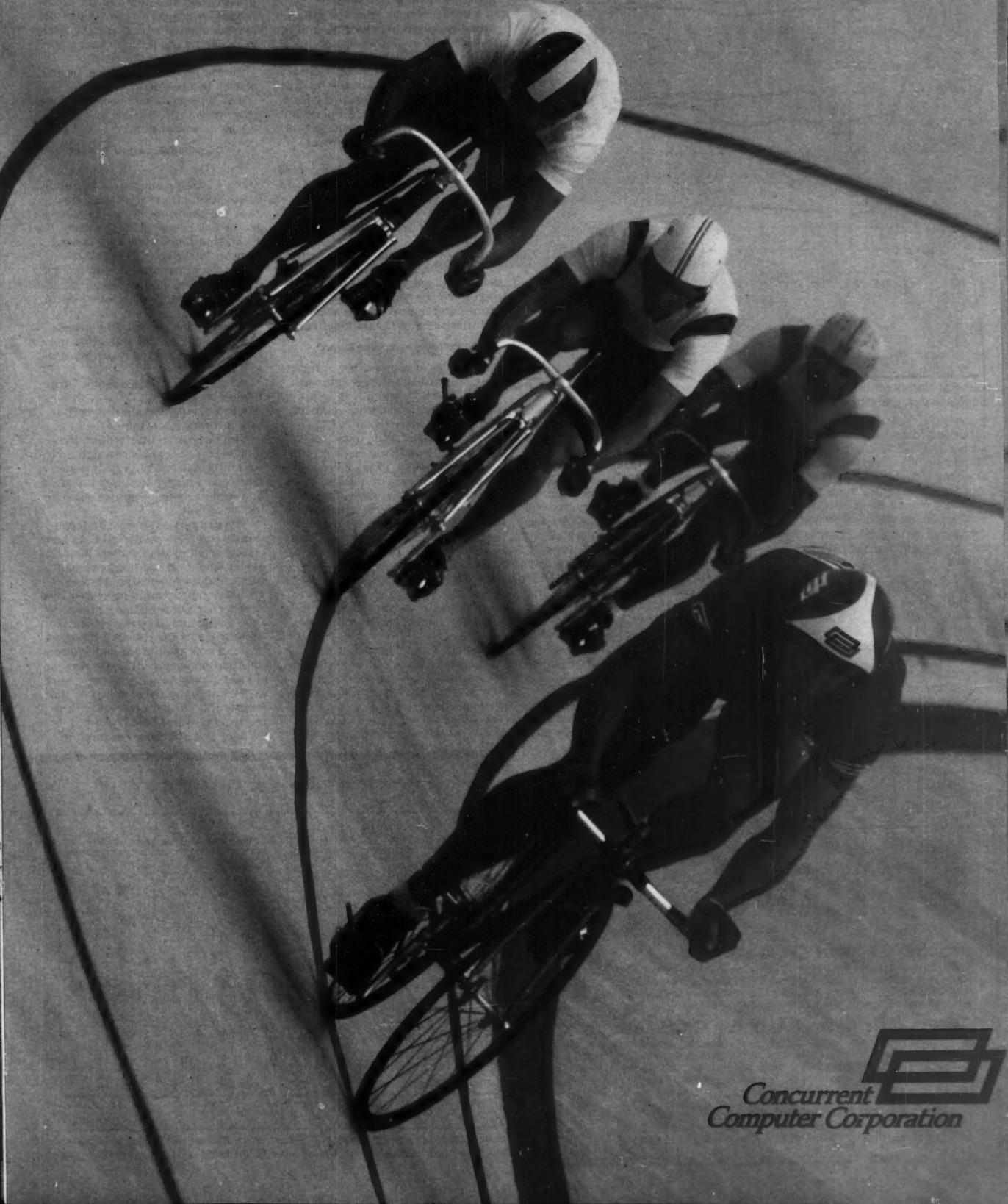


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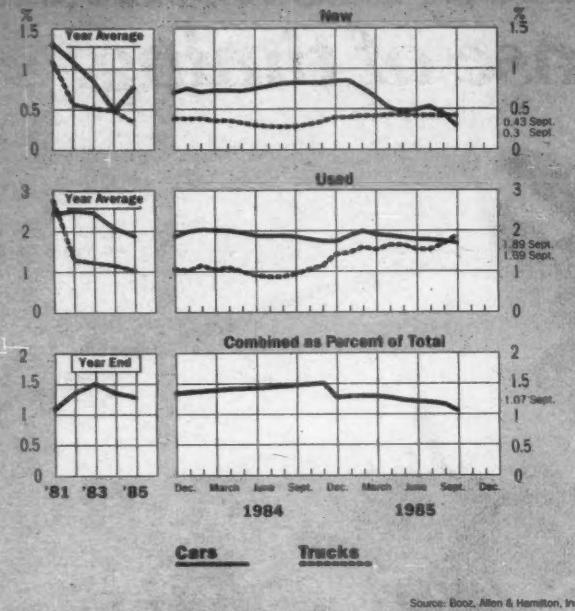
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In Depth/Million-Dollar Graphics

General Motors Acceptance Corp. — U.S. sample plot data


Source: Booz, Allen & Hamilton, Inc.

General Motors managers carry a pocket-size chart book with 200 pages of sophisticated graphics showing sales and operations trends.

reporting format at Hardees — from ad hoc studies by analysts to the "board book" of 50 tables and charts showing monthly results that was distributed to senior managers. At Hardees, management considers visual reporting the best method for retrieving information from computer memory and storing it in human memory.

Management data delivery

Florida Power & Light Co. was recently singled out by *Business Week* [Nov. 11, 1985] as one of America's best-managed utilities. Part of the explanation for the utility's extraordinary management reputation may be the unique way that its management data is delivered. The utility uses chart books instead of piles of printouts to determine how well it is performing, where it can improve and what to forecast for 10 years from now.

During the past three years, the output for five different manage-

ment systems has been converted from tabular to graphic:

- The utility's Quality Improvement Program organizes employees into teams to review various facets of operation and to suggest ways to improve performance. Each quarter, hundreds of computer-generated graphics delineate the effectiveness and participation of the groups and show the status of actions that they have recommended. The Quality Improvement Program is designed to help Florida Power & Light meet its stated goal: "During the next decade, we want become the best-managed electric utility in the United States, and be recognized as such."
- "The Energy and Customer Forecast" chart book provides 10-year projections, taking into account Florida's demographic trends, its demand for electric power and the effectiveness of the utility's conservation programs.
- "The Material Management Inventory Tracking" chart book helps

to lower holding costs while providing higher inventory turnover and better service levels. Charts show levels of availability and demand for each type of part in inventory. The chart book provides an easy way to analyze whether the utility has the right parts on hand and helps the utility maintain reliable service to its existing customers as well as timely hookups for new customers.

- In the nuclear area, the utility provides a monthly chart book of up-to-date data on power output, reliability, operating efficiency and safety-related information, based on the recommendations of the Institute for Nuclear Power Operations. Similar chart books cover the operation budget and performance indicators of the utility's fossil fuel power plants.

- A quarterly chart book from the Division of Planning and Administration covers a comprehensive range of information from new service accounts to cost per customer of supplying power.

Each of these chart books progressed through several stages of development, gaining new indicators, increasing the complexity of presentations and improving the accuracy and timeliness of the data delivery.

Portable reference library

In this most competitive of industries, General Motors Acceptance Corp. (GMAC) found a way to provide its executives with a compact, portable reference library of business-related statistical data that is continuously updated.

GMAC's system provides ready availability of data on interest rates, cost of funds, key statistics and important performance measurements. It provides this up-to-date information to its executives in a form that is usable outside the office: in cars, on planes, at home or at customer sites. The delivery system is a pocket-size chart book, 3½ in. by 5½ in., which is distributed to the top 70 managers. The chart book provides clear, concise and portable graphics representations of operations.

The booklets come in seven different series, containing 200 pages of charts, many with multiple graphics per page. Some cover passenger car financing in the U.S. and Canada, others cover truck and equipment

financing, and others cover general financial and economic indicators. The charts are detailed, containing both long- and short-term trends as well as current information (see chart at left).

Although GMAC published management chart books for more than 35 years, the reliance on manual processes restricted the degree of sophistication and depth of the charts. Computer graphics removed the delays associated with manual processes to reach their full potential.

In competitive situations, information is a powerful weapon. GMAC's pocket chart books provide that weapon at the time and place where it is most needed.

On schedule, within budget

The U.S. Air Force Systems Command (AFSC) manages a \$40 billion acquisition program. It must ensure that the government gets its money's worth from every AFSC procurement, that new technology is used appropriately and that contractors stay on schedule and within budget.

AFSC developed an Executive Information System with four overall goals:

- Improving information access.
- Automating and standardizing the flow of validated requirements and reports.
- Standardizing commands for information handling.
- Preserving and sharing corporate information resources.

The Executive Information System meets these goals through a visual information delivery system, which uses a graphics user interface and well-designed graphics summaries for output.

The delivery system, which contains a complete relational data base management system, covers manpower spending and program management data for every major AFSC acquisition program. The system also covers contract schedules, management indicators of performance, funding levels for research laboratories and dozens of other management information sources. The system can answer thousands of questions, such as, "What is the fiscal status of that program?" "Which contractors are performing worst/best?" And, "Where else are those contractors

Program manager assessment

	1986											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Program 1												
Program 2												
Program 3												
Program 4												
Program 5												
Program 6												
Program 7												
Program 8												
Program 9												
Program 10												
	↑ Better	↓ Worse	■ Satisfactory	■ Marginal	■ Unsatisfactory							

Source: Booz, Allen & Hamilton, Inc.

Successful graphics for senior managers show more than progress reports: They compare the current status of specific projects with management goals.

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We've poured on Parallel that leave Unipro

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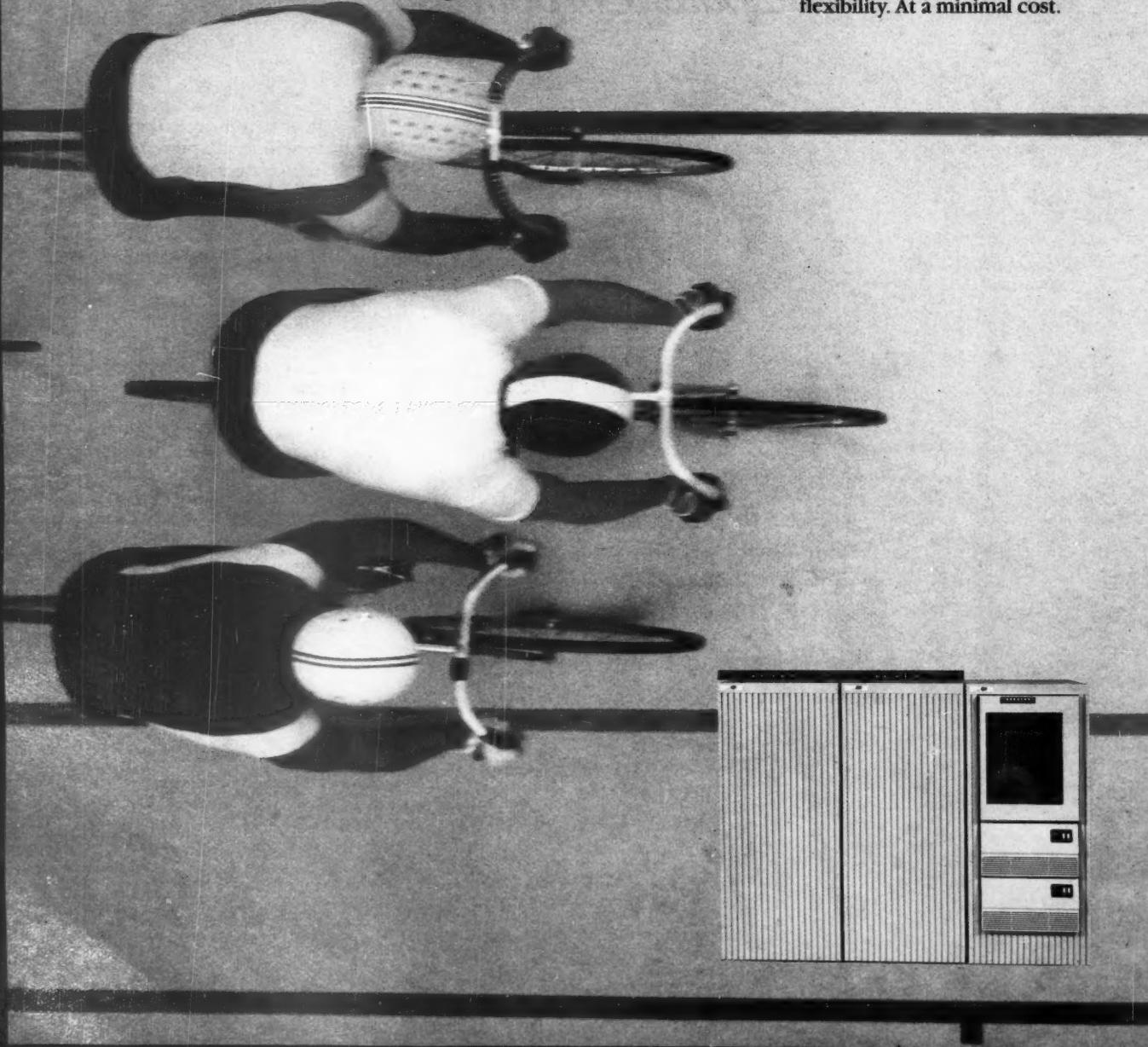
How parallelism works.

Every large application is made up of many interdependent tasks. A uniprocessing serial approach would execute them one at a time. Instead, we divide them into related segments, and distribute them to

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Some handle I/O or transaction processing. Others execute number crunching or maintain a database. But all work concurrently. And far more efficiently.

The advantages are clear. Computing performance is maximized, with dramatic increases in speed and throughput. No more I/O bottlenecks. The use of multiple processors provides inherent built-in availability. And a high degree of configuration flexibility. At a minimal cost.



Parallel Processing Solutions Processing in the dust.

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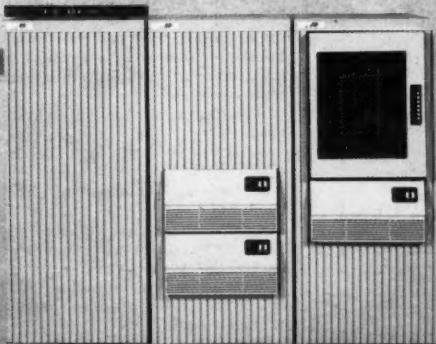
With a single machine, you're always bound by limitations. Either you're overcompensating, or you're compromising. But with our unique parallel processing solutions, you get just the computing power and speed you need. No more. No less.

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The race is on. And it looks like Concurrent Computer Corporation is about to take the lead.



*Concurrent
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In Depth/Million-Dollar Graphics

working on AFSC programs?"

Graphics are central to the success of the Executive Information System. The system contains so much information at so many levels that end users would get lost in a traditional user interface. But AFSC's user interface displays an organizational chart format, so end users can see where they are at any time. The organizational chart shows available graphics information displays rather than divisions or departments. Each move through this information architecture chart elicits a new set of relevant displays and shows how they relate to other information in the system.

Excellent client relations

Aerocorp is a pseudonym for one of the major aerospace companies that contracts with the government

to supply weapon systems. The competitive edge in aerospace contracting comes from a combination of getting jobs done on schedule and maintaining excellent relations with the client through open communications. Aerocorp must also write proposals that help the company win add-on business and new business.

Aerocorp found one visual information system application that helps them solve three key problems: developing winning proposals, getting projects done on time and within budget and maintaining open communications with the client.

The application, called Visual Project Scheduling and Control, consists of a series of approximately 70 different graphics designs that answer important questions about the status or the plan of every major program. Some charts provide sched-

ules with cost and cost variance analysis. Others show trends in spending, staff requirements by category, staff requirements vs. availability and general staff loading levels.

The system produces charts for the bid and proposal stage, and it produces weekly and monthly summary charts for all ongoing projects. The delivery system represents a major step beyond traditional project management systems because the visual formats make the data in the project plan and project performance visible at the top levels of the organization and to the client. No longer are the project details hidden in thick printouts or in the minds of a few knowledgeable staff members. With visual project monitoring, both the organization and the customer know the status and participate in

making sure projects are successful.

According to Aerocorp managers, visual project scheduling and monitoring provides five benefits in the program planning area and seven benefits in the program management area. In program planning, the benefits are as follows:

- It provides better evaluation of decisions on whether or not to bid on new projects.
- It indicates whether required staff is available for the projects.
- It justifies cost estimates for proposals.
- It creates low-cost, high-quality graphics for proposals.
- It identifies the projects' critical paths.

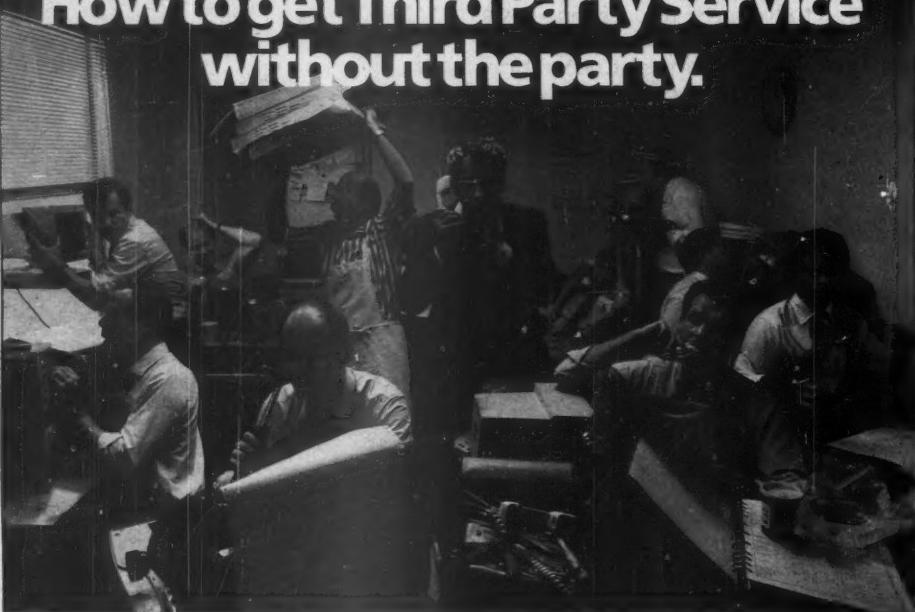
In the program management area, the visual information system offers the following benefits:

- Coordination of different programs over common operations.
- Cost control through planned data monitoring of past, actual and predicted data.
- Accurate predictions for staff requirements, both current and future.

"

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The impact of visual project scheduling and monitoring can be seen in the speed with which people took advantage of the system. Within 90 days after the system was implemented, 27 different major projects were being proposed or monitored using the tools. In the same time frame, more than 120 staff members learned to use the system. No other computer application ever grew so quickly to affect such a large proportion of the programs and staff at Aerocorp.

Finding strategic applications

Just knowing about strategic applications does not make them happen. Any organization must invest time and energy to overcome barriers to change. Five barriers must be lowered before an organization can make computer graphics into a strategic resource:

- Management's lack of awareness.
- Lack of access to high-speed hard copy.
- The stand-alone/stand-in-line mentality.
- Reliance on weak software.
- A laissez-faire attitude on the part of the support staff.

The organizations highlighted in this article have taken steps to solve each of the five problems.

For example, in each of the organizations described, one individual in an information services capacity

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In Depth/Million-Dollar Graphics

identified the fact that visual information systems could be of some potential value. That individual then took it upon himself to develop samples and show the capabilities of visual information systems to members of management on whose shoulders fell the responsibility for day-to-day operations in the organization. These managers then identified the potential applications that led to multimillion-dollar impact.

Stated differently, these organizations depended heavily on the direct participation of management personnel outside of the information services area. In general, they were not already computer users. To the contrary, for several managers who assisted in identifying strategic applications, their visual information systems were the first major comput-

"Most managers are not interested in learning how the technology works, what its future direction will be, how it affects the computers' operations or any of the other details that tend to fascinate the technologist. What managers are looking for is what the technology will do for them."

er applications with which they were ever personally involved.

These successful organizations used two methods of informing managers about these technologies: group briefings and personal briefings. The group briefings brought together dozens of managers to learn about applications of computer graphics that were used successfully

in other organizations. At the end of the briefing, usually one or more of the managers came forward with suggestions of important business problems that could be addressed using these computer graphics tools.

Alternatively, the information systems proponent of computer graphics would visit individual managers and show them examples of

important applications. In many cases, these visits led to pilot projects that implemented computer graphics solutions to marketing, finance, quality control, engineering, project management or other key areas of management.

Common to both of these methods, and, in fact, essential to all management awareness programs in technology, was the use of case studies. Most managers are not interested in learning how the technology works, what its future direction will be, how it affects the computers' operations or any of the other details that tend to fascinate the technologist. What managers are looking for is what the technology will do for them.

The only effective method known for communicating the answer to that question is to present examples that are relevant to the problems that those managers are trying to solve.

Accessible graphics hard copy

Requirements for high-payoff applications from graphics generally exceed the capabilities of the low-cost plotters that are so common in offices today. Dozens or hundreds of charts are required with very short deadlines. Digital plotters requiring operators to feed paper become barriers to high-volume graphics applications. Busy managers do not have time to baby-sit plotters.

Organizations that use high-payoff graphics applications have discovered that their graphics hard-copy equipment must be a shared resource on the network consisting of relatively higher priced, higher speed, operator-free machines. Even those using digital plotters have purchased automatic paper-feed plotters and connected them to the network, so that the computer can run the plotter continuously, even at the same time that development or previewing of new charts is proceeding. If the plotter were tying up the graphics workstation, simultaneous development and production would be impossible.

Several of the successful organizations are moving beyond the digital plotter to high-speed laser printers. A laser printer, serving as a networked graphics device, changes the body of potential users for computer graphics. Since the laser printer is the same printer that can produce standard listings and typewritten or typeset text, it is not considered a technological curiosity. Rather, end users consider it a standard business tool. By converting the laser printer into a graphics system, the organization makes graphics into a standard business tool.

Where high-speed laser printers are available on a mainframe or minicomputer, volume production of charts is no longer so burdensome. Users feel free to suggest applications that require hundreds or thousands of charts. Such suggestions would have been met with derision in the prelaser days.

Stand-alone/stand-in-line

A common tendency with computer graphics is to put graphics capabilities in an information center and then invite any person who wants to use the tool to come in and borrow the graphics workstation and the graphics hard-copy equipment. Busy executives do not find that a very enticing offer. "What happens,"

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In Depth/Million-Dollar Graphics

they ask, "when two or three managers all need presentations done at the same time?" Even worse, what happens if the equipment is down?

The graphics facilities in information centers today consist mainly of either personal computers with small digital plotters or graphics CRTs with a plotter or a matrix printer attached. Both of these facilities reinforce the idea that computer graphics is a personal tool and should not be relied upon as a production-oriented resource for repetitive, high-volume applications.

How can we expect managers to perceive the technology as useful when it is delivered in a package that appears slow, cumbersome, unavailable and unreliable? The common response is that end users who have high-volume needs can buy their own graphics hardware and software. This response just establishes a new barrier. Now potential high-value users must prove that their applications will be so valuable as to justify \$10,000 to \$30,000 worth of equipment before they can ever prototype it.

In the organizations mentioned, computer graphics was delivered as a corporate resource, not as a stand-alone technology. Potential users could try out the technology at their own desks using shared graphics hard-copy devices and any terminal connected to the mainframe computer. No new user had to buy equipment before developing a prototype application.

As you can see, the solution to this problem is highly dependent upon making graphics hard-copy equipment into a shared resource. But, in addition, the graphics software was delivered on shared high-powered computers so that individual users could get access to it without having to go through long software or hardware acquisition cycles or stand in line waiting for a workstation to become available.

Buying the best

"Graphics software differs greatly in its quality. It pays to get the best in order to sell the information center capabilities to senior management." With these words, James Martin, America's data processing guru, summed up his solution to the paradox of graphics software in his book, *Application Development Without Programmers* (The Telecom Library, New York, 1982). The paradox arises because graphics is one of the simplest computer applications, and yet users rarely are satisfied with their graphics capabilities.

In other words, there is a very short "mean time to anger" before a user of a high-payoff computer graphics application becomes frustrated with graphics software capabilities that seemed so rich only a few days or weeks earlier.

All demand for graphics seems to be cumulative. The chart that is requested on Day Two is the one that was requested on Day One, plus "just a few changes." The changes mount up, especially in high-payoff applications, until a single page may have five, 10 or 20 changes. Each chart may have bars and lines and text and tables on it. Special graphical symbology and logos may have to be added. And all of it has to be designed for reading by people whose eyesight is not as good as it was when they were 18 years old.

The fundamental requirements for

graphics software for high-payoff applications consist of the following:

The ability to say "Yes" every time a request is made for changes, combined with the power to produce the revised charts automatically once the design changes have been put in. In other words, the system must be able to create whatever chart is requested and then to make chart production a hands-free operation. The software should be able to produce a hundred charts automatically in the time that an operator could design a single chart.

Quality at least equal to the best that the manual graphics arts department produces. Anything less risks embarrassing the people who use the visual information and those who produce it.

Automatic access to data so that the information does not have to be

typed in. Data access for high-payoff applications generally requires more than traditional fourth-generation languages. The access methods must include facilities for reading files and reports generated by other application programs.

Chart book library systems that maintain the designs on-line so that new users do not have to reinvent charts; they can use charts already designed by expert users or by graphics designers.

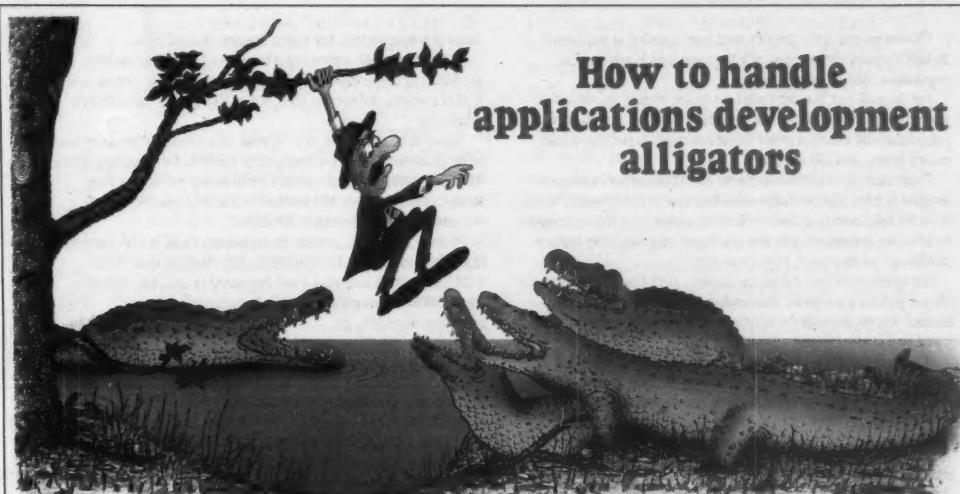
Intelligence to assist users with complex tasks that would be too time consuming or would reduce the value of the charts. Examples include the following: automated conversion from colors to black and white when monochrome handouts are needed; automated reduction algorithms that make charts small enough to put multiple charts on a page but that

increase the size of the lettering so it remains readable even on the small charts; and features such as automatic color selection so that users do not have to become color experts.

Project management graphics with predesigned charts for project scheduling, critical-path methods, staff requirements and cost analysis. These charts have to be predesigned because their complexity is sufficient to deter potential users who would be forced to design their own.

Instant on-line delivery systems for executive access to up-to-date charts of key management indicators.

These requirements might best be considered a hierarchy of needs. As each requirement is met, the need to meet the next one becomes essential. At first, new users of computer graphics ask for simple bar and line



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charts. A week or two later, they are trying to combine bars and lines on the same graph, put numbers inside each of the bars or put tables at the bottom of the charts. If their software allows them to make their charts more complex, then they get a request from management for several sets of those charts every week or every month.

Suddenly it is no good to have a system that allows them to draw the chart with a mouse on the computer. They do not have the time to do that every week. Further, as the number of charts grows, data entry begins to take up time and to create new errors. At that moment, the requirement for automatic data access rises to prominence.

This process of uncovering new requirements continues until the strategic application is fully imple-

mented and has been working for several months or a year.

This common scenario of problem/solution/new problem is the underlying justification for Martin's admonition that it pays to get the best. When you skimp on the software side, labor has to be substituted for software. With tight deadlines, high-volume requirements and high visibility of strategic applications, substituting labor for software is a recipe for disaster.

stuting labor for software is a recipe for disaster.

Effective support

One visible characteristic that separates the organizations with strategic applications from those without them is the visual information system proponent that is always found in the successful organizations. Here, one or two people have

Chances are you don't currently audit your operating system—even though it's ultimately in control of information used to manage your organization. And for good reason.

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For more information, contact Shawn McLaren today, at 1333 Lawrence Expressway, Santa Clara, CA 95051-3595; (415) 941-4558; Telex 357437. AEX2-Examine/MVS is developed and maintained by SKK, Inc., Rosemont, Illinois. ■ Examine/MVS and AEX2-Examine/MVS are trademarks of SKK, Inc.

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taken on the job of making graphics successful. These people recognize that the vendors' claims of ease of use are accurate only when end users have someone to turn to for help over the initial hurdles.

Far from adopting a laissez-faire attitude, the visual information system proponent runs training programs, provides help in linking to data, maintains chart libraries and is available to provide a helping hand to end users in need.

The need for a person with such a high degree of commitment to visual information systems graphics brings us full circle in the five requirements. Unless management is aware of strategic applications, it will consider computer graphics to be a new toy rather than an important tool. Without clear justification, information systems managers will not supply the hardware or software, or they may not assign sufficient staff to provide good support.

Thus, the first step is to develop end-user managers' awareness of the value of visual information systems. Once they perceive the application, they will help justify the cost of doing the job right. The question will change from "Are we an organization that needs high-payoff graphics?" to "Which of our applications could benefit from high-payoff graphics?"

Excellence in the 1980s

How a company uses charts and who in the organization produces them determine success more than what kind of company it is. The best chart-producing teams consist of partnerships between managers inside and outside information systems departments.

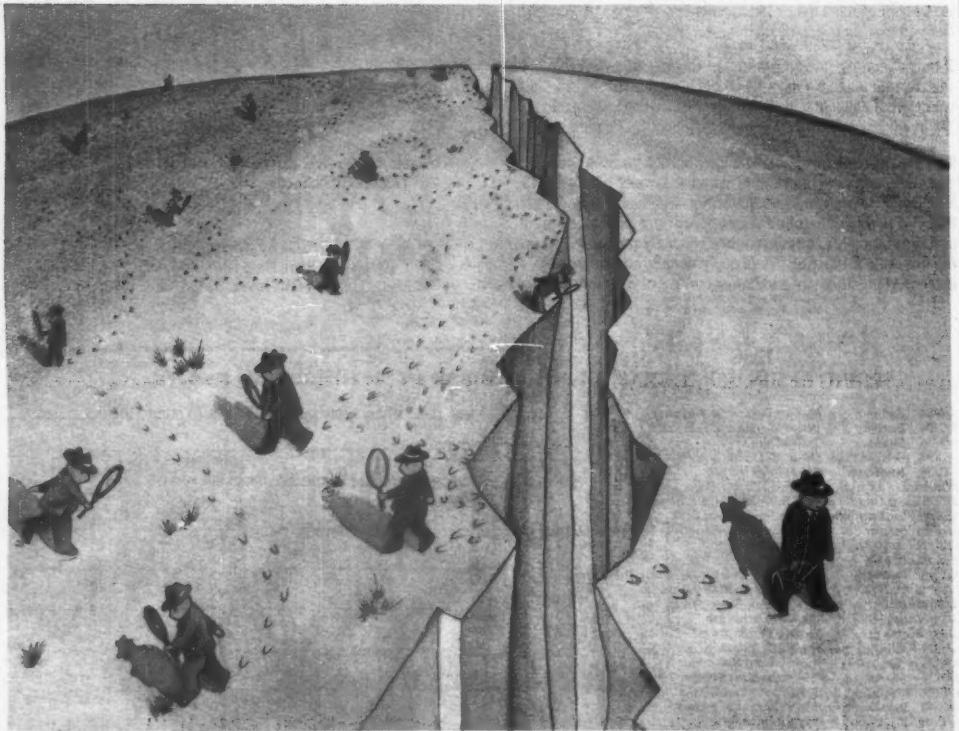
Overall, the most consistent error in implementing graphics systems for senior management stems from new users trying to replicate their standard printouts — just converting them to a visual format. By contrast, the most successful chart books show data beyond the standard printed reports, data that may never have appeared in weekly printouts or at least was not pinpointed in the same way.

The lesson is this: Do not bury key indicators in the midst of useless indicators. Instead, orient chart books toward specific goals that management aims at already (see chart page 70). The measure of a worthwhile chart lies in whether or not management actions will result from it — whether decisions will be made on the basis of it. Charts do not yield as high a payoff if used for reference only.

Excellence in information systems during the second half of the 1980s will be measured in large part by the impact of information systems on the success of the business — in other words, on strategic and competitive applications for information systems.

Computer graphics stands at a crossroads: It can either be supported as a personal tool for personal presentations or as a strategic resource. The successful organizations identified in this article have all discovered that the strongest approach supports both aspects of computer graphics: offering personal graphics for personal applications while, at the same time, meeting the five requirements that make visual information systems feasible and valuable in their organizations.

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In Depth

System/38 grows up

By DAVID ANDREWS
and FREDERICK MANTEGHIAN

In June 1984, Sealectro Corp. in Trumbull, Conn., decided to replace its IBM 4341 Model 2 computer with an IBM System/38. In less than a year, all of Sealectro's systems were replaced with improved applications, and a number of new ones were implemented as well. All of the new applications were interactive and used a relational data base.

The computer staff shrank from 20 to eight, with the programming staff dropping from 10 to three, yet the smaller staffs were able to accomplish significantly more work. The number of on-line terminals increased from 50 to 75, but the total cost of data processing fell by more than 20%.

Jeff Hosking, Sealectro's vice-president of finance, managed the replacement project. Hosking says, "The System/38 has given us more capability for less cost with a much smaller staff, and we still haven't exploited its full capabilities."

Sealectro is not the only company that discovered the System/38. Giant computer users like General Motors Corp. and Union Carbide Corp. have made extensive use of the System/38 for several years.

In spite of numerous success stories, the impact of the System/38 on the U.S. computer market has been limited in the six years since deliveries began. It appears, however, that the System/38 is finally ready to take off.

While IBM is secretive about its marketing strategy, the System/38 seems to be getting the marketing attention its technical track record has earned. IBM marketing management began to notice that System/38 users are among IBM's happiest customers. In addition, the System/38 is one of IBM's strongest products in Europe and Japan.

Management noticed that it was easier to sell and support a System/38 than a comparable 4300 series system and that installed System/38s generate add-on sales for disk storage, proces-

sor upgrades, memory, terminals and maintenance with little sales effort.

As a result, IBM recently designated the System/38 a "strategic" product and directed its sales force to make a greater effort to sell System/38s. IBM will soon announce a number of dramatic enhancements for this system, including larger processors, more disk storage, increased main memory, a new low-end model and the ability to run the System/36 SSP operating system and programs.

Why has the System/38 taken so long to gain serious recognition? Three factors slowed its acceptance in the U.S.:

- The product got off to a bad start.
- It has been the victim of internal IBM politics and organizational changes.
- The System/38's unique architecture makes the machine hard for potential users and IBM's own sales force to understand.

Limiting factors

The history of the System/38 shows how these factors worked to limit its initial success.

In the early 1970s, IBM started to work on a replacement for its newly developed 370 series. Two project teams were put to work on the design. The team that was given the assignment of developing a better 370 came up with the 3030 series and the 4300 series. The other team was told to develop an ultimate computer architecture or "future system."

In the mid '70s, an internal study showed IBM management that 370 users would not tolerate a conversion to a new architecture, and the future systems team was broken up.

The more than 1,000 future systems team members were reassigned to a variety of locations, but a number of them went to the General Systems Division, where a similar group was developing a new computer architecture.

IBM created the General Systems Division to counter the threat posed by the minicomputer companies and to hedge against an unfavorable antitrust judgment. The General Systems Division developed and sold smaller computers such as the System/3, System/34 and Series/1. The division operated through its own network of sales offices that competed directly with



PHOTO BY P. CHARLES LADOUCEUR

By all reports, System/38 users are among IBM's happiest customers. Once the victim of internal politics, System/38 — with its enhanced architecture — is strategically positioned as IBM's mid-range computer for the future.

Andrews is president of Andrews, Duerr and Manteghian, Inc. (ADM), a computer consulting firm in Cheshire, Conn. Manteghian is vice-president and cofounder of ADM.

In Depth/System/38

"

The particular features of the System/38 make it easier to program than more traditional computers, especially interactive data base-oriented applications. As a result, System/38 shops tend to have small programming staffs and no systems programmers.

IBM's larger Data Processing Division, which sold the 370 product line.

The future system concept and the new architecture under development within the General Systems Division formed the basis for a new product, designed to replace System/36 and outgrown System/34s. IBM announced the System/38 in the spring of 1979, but within just a few months, serious software problems emerged, forcing the company to an-

nounce a one-year delay in availability for the product.

Plagues

After deliveries began in 1980, problems continued to plague the System/38. The first two processor models lacked the capacity to act as effective replacements for a fully configured System/3. The smaller processor barely had enough capacity to run the operating system. Even the larger model did not include enough main memory

to handle a large interactive load, and it was slow as a batch processor.

Data communications was weak, backup and recovery were slow and there was a shortage of trained IBM systems engineers to support the product.

In spite of the problems, users liked the System/38 because it was easy to program, included a powerful but easy-to-use data base and handled interactive programs very well. During 1981, IBM started the slow process of correcting the system's problems by improving the operating system and adding a more powerful processor along with other capabilities.

By 1982, the General Systems Division had outlined its usefulness. The threat from the minicomputer vendors had diminished, and the government's antitrust suit had been dropped. IBM reorganized its sales force into two groups: the National Accounts Division, which was to sell to large, mainframe-oriented clients, and the National Marketing Division, which was to cover smaller accounts.

Suddenly, all of IBM's sales people were selling both System/38s and 4300 series computers. The majority of the sales force had no familiarity with the System/38, and most of them were accustomed to thinking of it as a competitor.

As a result, the National Accounts Division sold a relatively small number of System/38s. In the National Marketing Division, sales of System/38s started slowly but grew steadily. By 1984, the system became the largest revenue producer for the division, out of total revenues of more than \$10 billion per year.

Improvements in all areas

From 1982 to 1985, the System/38 improved dramatically in every area: processing power, main memory, communications, backup and recovery, disk capacity, terminals, operating system capability and data base system features. Local technical support also improved dramatically, and a large number of high-quality applications packages were developed by IBM and a host of independent companies.

In January this year, IBM again reorganized its branch sales network. The large account/small account organization was replaced by a regional concept: Local branches now serve all the needs of IBM customers in their respective areas. It appears that the latest reorganization may lead to greater efforts to sell System/38s in the U.S. IBM's 1986 sales plan includes larger commissions for selling System/38s than ever before.

While the U.S. sales

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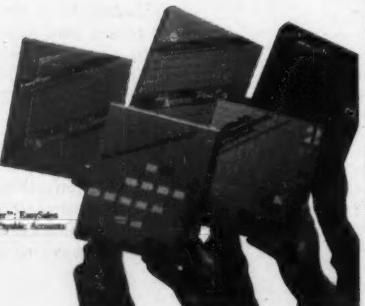
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divisions of IBM were organizing and reorganizing themselves, their counterparts in the rest of the world were out selling System/38s at a surprising rate. More than 60% of the 18,000 System/38s sold to date are installed outside of the U.S.

In 1985, for example, about 900 System/38s were sold in Japan vs. approximately 1,100 in the U.S. Since the Japanese computer market is smaller than the U.S. market and since IBM's overall market share is smaller, System/38 sales clearly represent a large part of IBM's total Japanese sales.

Why are the Japanese buying so many System/38s? The advanced architecture, the high productivity of System/38 programmers and the ease of use appear to appeal to Japanese computer buyers.

What is it that makes IBM's "future system" computer so unique? First, the System/38 architecture is closed, meaning IBM does not publish detailed technical specifications on how it works. As a result, there are no plug-compatible System/38 computers on the market and no third-party operating system products available.

There are several other unique concepts behind the System/38 design:

Integrated system software. The operating system does all of the functions performed by a variety of separate products on mainframes. To get comparable functionality on a 4300, a user would need VM/CMS, DOS/VSE, CICS, SQL and a variety of other products.

Single-level storage. The System/38 user sees a single large, virtual memory space for all programs and data.

Integrated relational data base management. The relational data base management function is an integral part of the operating system. It operates very efficiently because the operating system and hardware were designed with the relational data base in mind.

Friendly control language. The System/38 control language is both simple to use and very powerful. A System/38 environment does not require system programmers.

Programming productivity. The RPG-III programming language, combined with a variety of powerful utility programs and operating system commands, makes the System/38 extremely easy to program. Our own experience is that a programmer is three to five times more productive on a System/38 than on a 4300 with Cobol, CICS or a traditional data base management system.

Interactive orientation. The System/38 hardware divides the tasks involved in supporting interactive processing among a number of specialized processors within the system, allowing it to handle a heavy interactive load efficiently.

Field upgrade. Any System/38 model can be field upgraded to any larger model.

Large addressable space. The System/38 design allows it to address uniquely more than 18 trillion gigabytes of storage.

Networking capabilities. The System/38 can act as a host in an IBM Systems Network Architecture network, supports a variety of protocols including X.25 and can be loosely coupled for multiprocessing. When a System/38 is networked with a mainframe, terminals on either com-

puter can access applications on the other.

Writing applications

The particular features of the System/38 make it easier to program than more traditional computers, especially interactive data base-oriented applications. As a result, System/38 shops tend to have small programming staffs and no systems programmers. Since applications packages can also be written quickly, the time required to develop and implement an application is often much shorter than on a mainframe using traditional programming techniques. System/38 packages tend to cost less than half of what a package of similar capability would cost on a mainframe.

While applications written for other computers in Cobol, PL/I, Basic

or RPG-II can be converted to run on a System/38 with the help of various conversion programs, most System/38 sites end up either implementing packages written specifically for the System/38 or rewriting the applications themselves in order to take advantage of the System/38's particular capabilities.

Much of the large body of available software for 370 mainframes is thus not readily available to the System/38 user.

The System/38 has other limitations. It offers no hardware floating-point capability or Fortran compiler, making it uncompetitive as a scientific or engineering processor. There is no available assembly language or ability to alter the operating system, limiting its use for highly specialized applications such as process control.

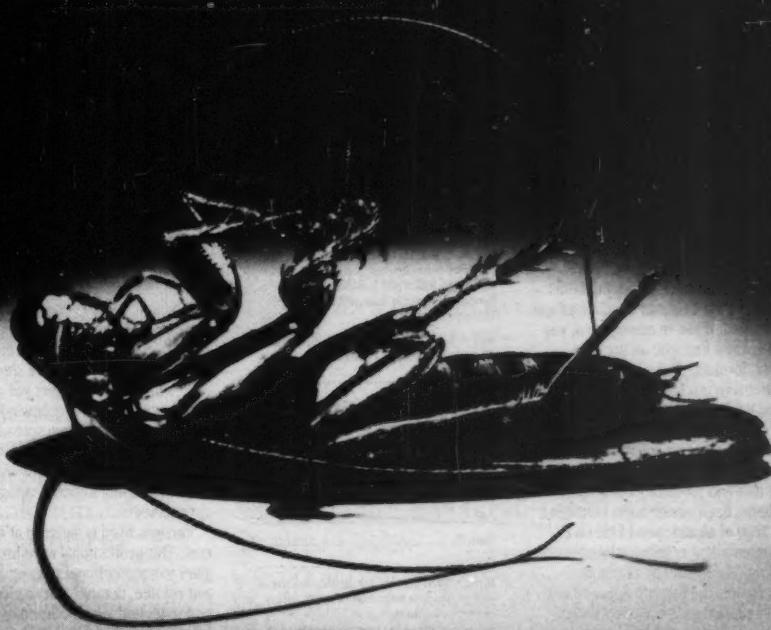
The largest configuration avail-

able is powerful by mini standards but still amounts to no threat to replace large-scale mainframes. The top-end Model 40 can support 256 local terminals plus numerous remote devices on up to 12 communications lines. Its main memory goes up to 16M bytes. Up to 6.6G bytes of disk storage can be attached.

Upgrades to the System/38 hardware and software have surfaced every nine to 12 months since its introduction. According to reliable IBM sources, within a few months, a new top-end System/38 will be announced that will double disk, memory and processing power.

For years there has been speculation that IBM might drop the System/38 because it complicates IBM's already confusing collection of computer architectures and because it competes directly with the 4300.

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series. Furthermore, relatively few computer professionals have any experience with the system.

Conversely, some experts have speculated that the System/38 might form the basis for a future generation of top-end mainframes since the architecture can easily handle expansion.

We believe that both of these theories are wrong. Based on information from sources close to IBM's Rochester, Minn., laboratories, IBM's strategy is to position the System/38 as its main mid-range computer.

This will be accomplished by enhancing the System/38 dramatically over the next two years, then replacing both the System/38 and the System/36 with a new computer. This new machine will not be a field upgrade of the existing System/38, but it will retain the System/38 architec-

"Upgrades to the System/38 hardware and software have surfaced every nine to 12 months since its introduction. According to reliable IBM sources, a new top-end System/38 will be announced that will double disk, memory and processing power."

ture and the CPF operating system.

The first step toward this new machine will be taken later this year when it will become possible to run SSP, the System/36 operating system, on System/38s. At the same time, IBM will announce a new low-end version of the System/38.

These moves will accomplish a number of objectives: System/36 users running out of capacity will have

an easy upgrade path, System/38 users will have access to the large library of System/36 applications and the remaining System/34 and System/3 users will be strongly motivated to go directly to the System/38.

Fate of 4300 users

If the System/38 becomes IBM's preferred mid-range system, then what will happen to the 4300 series?

We believe that IBM will continue to push larger 4300 series users toward MVS and that support for DOS/VSE will fade in the next few years. Those users that do not want to move up to MVS will be encouraged to switch to the System/38.

Meanwhile, IBM will continue to offer non-water-cooled 370 processors like the 4381 for many years to come, and the company will attempt to control production costs by using as many common components as possible for the 4300 and System/38 product lines. IBM already started moving in this direction by offering common terminals and other devices for the two product lines.

During the next two years, the System/38 will see a number of important enhancements, including the following:

- Larger processors with more memory.
- New disks and a dramatic increase in total disk capacity.
- More communications lines and higher speed lines.
- A low-priced, entry-level model.
- Enhanced engineering/scientific capabilities.
- New terminals and support of ASCII terminals.
- Enhanced multiprocessing capability.
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- Improved communications capabilities, especially with X.25 nets and IBM's Token-Ring network.
- More office automation software and features.

The original role for the System/38 was to replace the System/3, to provide an upgrade path for System/34 users and to help counter the threat from competitive minicomputers. As IBM positions the System/38 as its strategic mid-range system, it will be both a general-purpose computer for smaller organizations and a specialized system for large users.

The roles the System/38 will play in larger companies include the following:

Distributed processing. The System/38 makes sense where complex applications are needed but a large local staff is impractical.

Office automation. As the System/36 and System/38 product lines merge, the System/38 will become the focal point of IBM's future office automation offerings.

Departmental systems. The programming productivity of the System/38 makes it attractive as a system dedicated to the unique needs of a single department.

Personal Computer control. The System/38 will increasingly be used as a file server and network controller for a group of Personal Computers.

The new sales organization in the U.S., the 1986 commission structure and the new products and capabilities that will be announced later this year should all lead to greater System/38 sales — slowly, since IBM's mainframe-oriented sales force still has a great deal to learn about the System/38.

After a rocky start, the System/38 has matured into a powerful product for IBM. It is here to stay, not as a replacement for mainframes but as a powerful general-purpose computer for smaller organizations and as an alternative for distributed processing, departmental systems, office automation and PC control in large organizations.

LOTUS 1-2-3® FARSIGHT.

WHY THEY'RE ALIKE.

For starters, the Farsight Spreadsheet works like a clone copy of Lotus version 1A, the one over a million people already use. If you're among them, you already know Farsight: all the commands, formats, all the keyboard- and menu-driven macros.

You don't have to re-learn a thing. Your existing 1-2-3 files, macros and templates will never know the difference, either—so your investment in 1-2-3 data and procedures is secure. But Lotus itself wants you to surrender your copy of 1A and spend \$150 on a new release that requires a lot of re-training. Thanks, but no thanks.

Compare: the Farsight Spreadsheet is fully supported by the people who created it. And Farsight gives you some amazing high-voltage features to work with.

IBM is a registered trademark of International Business Machines Corporation. 1-2-3 is a registered trademark of Lotus Development Corporation.

Hardware requirements: IBM PC family or 100% compatible, dual-floppy or hard disk, PC-DOS 2.0 or higher.

YES, rush me _____ copies of Farsight, non-copy protected and money-back guaranteed for 30 days. Enclosed is \$99.95 plus \$7.00 shipping and handling per copy. In Texas, add \$6.13 sales tax. U.S. prices only.

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(713) 523-8422

WHY THEY'RE DIFFERENT.

Farsight frees you from the hassles of copy protection. It costs \$99.95, which isn't cheap; rather, at \$495 Lotus and others are almost criminally overpriced. \$99.95 is exactly what high quality, feature-loaded software should cost.

Features! Farsight gives you pop-down menus. And multiple windows: now you can work on two spreadsheets at the same time—and handle your disk file management chores and word processing without leaving the spreadsheet.

Farsight Word is included at no extra cost. This professional word processor gives you proportional spacing, search and replace, decimal tabs, multiple typestyles and lots of other convenience features found in the most expensive word processors.

Everything's integrated, too: use Farsight windows to "paste" spreadsheet results directly into your letters and reports.

One other thing: you get a 30-day money back guarantee. So you can't lose. Order Farsight; do it now. You'll get everything you love about Lotus. And that's just for starters.

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ONLY \$99.95

At 19,200 bps, speed alone can be blinding.

In the race to claim the fastest high speed modem, many modem companies advocate basing your buying decision on one thing: speed. What's happened, unfortunately, is that modem purchasers are getting so caught up in modem speed they're losing sight of the most important consideration.

Modem performance. So before you rush into a high speed modem, ask yourself two simple questions. What level of performance do you really want out of a modem which operates at 19,200 bps? How much more efficient will it make you?

*Based on average installation and leasing charges for 3002 D1 circuits as of 10/85.

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The answers to these two questions will lead you to one modem.

Introducing the Codex 2680.

It's the thoroughbred of 19.2 kbps modems. The superior performance of the Codex 2680 is achieved by utilizing enhanced 64-state 8-dimensional Trellis Coded Modulation (64 x 8 TCM), enabling Codex to position error-correcting data in a smaller signal constellation, thereby making it less susceptible to line disturbances.

In actual use the Codex 2680 delivers 99.9% error free data over more than 90% of standard 3002 D1 conditioned lines at 19.2 kbps.

The big payoff.

Speeds of 19.2 kbps allow you to realize dramatic increases in efficiency and productivity. Without increasing expenses or staff resources. And these savings add up. Fast. With its standard 2-channel multiplexer, you can eliminate extra lines. For example, by combining two separate 9600 bps circuits into one leased-line at 19,200 bps typical savings for a New York to LA link are greater than \$24,000 per year.*

What's more, the Codex 2680 offers complete network management capabilities for monitoring and fault isolation. It can operate independently or with your central site Codex network management system, to ensure greater network availability. In short, it's a modem that's really a true network system resource.

It's all perfectly clear.

Another important feature of the Codex 2680 is the fact that it is shipping right now. Not tomorrow. Now.

If you still have questions or would like a product demonstration, simply call 1-800-426-1212, ext. 227.

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Dept. 707-227,
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Mansfield, MA
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tem and a new architecture that we call Precision Architecture.

ciency while maintaining compatibility with our current products. In fact, the performance levels have been so dramatic that a new generation of HP computers is being built around HP Precision Architecture.

THE LONG RUN.

Since the HP 3000 Series 930 is part of a family, it's compatible with existing HP 3000's. And HP Precision Architecture assures compatibility with the new, more powerful HP computers to come. Because we don't believe in temporary solutions.

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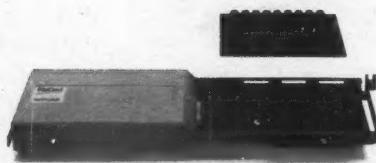


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NEW PRODUCTS

Map-Master tool begins shipping

Decision Resources Co. of Westport, Conn., last month announced and began shipping Map-Master, a \$395 mapping software package for businesses that allows users to create custom maps to use in slide presentations, reports and overheads.

Map-Master permits users to view data by country, state, county or ZIP code or to define their own region. The product can then produce shaded maps geographically displaying corporate sales, demographics and other information.

With Map-Master's DataGrabber feature, information from data bases and spreadsheets can be imported and displayed in map form. Data can also be entered manually.

To create a map, users enter data, and Map-Master converts it into a map, complete with colors or hatching patterns displaying the data according to state or region. Map-Master also adjusts the map as new data is entered. Users can insert or change map features such as symbols, fonts and text. Eight colors are available as are seven fonts, 94 symbols, 16 type sizes, italics and underlining.

In addition, the product is bundled with a library of demographic and statistical information such as income, age, population, retail sales and market potential for 50 states. Other libraries, including boundaries of the U.S. by county, metropolitan area, area of dominant influence, designated market areas and boundaries for the world by country, are available separately for \$95 to \$185.

Map-Master runs on IBM Personal Computers and compatibles with a minimum of 384K bytes of random-access memory and a graphics adapter. For color monitors, the package requires an IBM Professional Graphics Controller, IBM Color Graphics Adapter or Enhanced Graphics Adapter. For monochrome monitors, the package requires a Hercules Computer Technologies Co. card.

Trans-Lux Communicator stars nonvolatile memory

PC able to compute while sending, getting messages

Trans-Lux Corp. of Norwalk, Conn., announced the Trans-Lux PC Communicator, a communications device that turns a personal computer into a telecommunications terminal while allowing the computer to continue running separate programs.

According to a company spokesman, the product allows users to simultaneously compute and send or receive messages.

PC Communicator is based on a Zilog, Inc. Z80 microprocessor, contains AT&T 103 and 212A modems and an V22.BIS 2,400 bit/sec. modem and plugs into an IBM Personal Computer or compatible expansion slot. Because the device includes 128K bytes of nonvolatile memory (expandable to 256K bytes), none of the microcomputer's memory is needed to send, receive or store messages. Users can store up to 99 sent messages and 999 received messages, the firm said.

PC Communicator also has a real-time

clock with battery backup that stamps every message with the date and time and provides message security. An auxiliary RS-232 port can be used to connect PC Communicator to a second printer to print out messages.

A communications program on the plug-in board controls outgoing dialing, incoming answering and all line connection functions including setting bit/sec. rates. Additionally, an on-disk communications program provides Help screens to assist in composing and transmitting messages in the protocols required for certain networks.

Because messages can be composed and then transmitted at predetermined times, users can save money by sending messages on weekends or late evenings when telephone rates are lower, according to the spokesman.

Although PC Communicator will be sold for \$1,395, the product can be leased for \$57 per month for the first year, \$54 per month for the second year and \$51 per month for the third year. Installation and removal of the product, however, is extra.

INSIDE

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Pathway line for IBM debuts

Pathway Design, Inc. of Natick, Mass., has announced a micro-to-mainframe product line that is said to allow IBM Personal Computers and compatibles to communicate with IBM System/34, 36 and 38 minicomputers on an IBM Systems Network Architecture (SNA) network.

According to a company spokesman, PCpath 5250 supports four concurrent sessions with the host. It emulates a Pathway 5251 Model 12 with attached displays and printers. It includes all attributes of the standard 5250 device, including support for monochrome and color displays as well as support for the complete set of 5250 commands and special function keys. The product operates on dial-up, leased and

point-to-point lines at speeds up to 9.6K bit/sec.

With PCpath 5250, a user can establish multiple communications sessions with the host, flip between the sessions and maintain communications sessions in the background while initiating a local personal computer application in the foreground, the spokesman said.

Pathway's PCpath 5250 also includes a bidirectional file transfer package for text and binary data. The software, called Decisionlink file transfer software, was developed by Laguna Laboratories, Inc.

Available in June, the PCpath 5250 software, Decisionlink and the Pathway Communications Adapter cost \$750.

Tandem announces Measure

Performance monitor for Nonstop systems

Tandem Computers, Inc. of Cupertino, Calif., has announced Measure, a full-function system performance monitor for use on Nonstop systems.

Measure, a replacement product for Tandem's existing performance measurement product Xray, is said to allow users to collect and examine performance statistics for systems software and hardware components, including CPUs, disk drives, remote systems, communications lines and software components.

Measure was designed for the Tandem multiprocessor environment. It can make up to 64 concurrent measurements. Different users may start and stop measurements concurrent-

ly, interactively or at predesignated times. Measure also contains a capability for collecting application events through user-defined counters.

Measure has fault-tolerant features that automatically restart measurements when processors are restarted. According to the vendor, it is highly integrated with Tandem's Guardian 90 operating system.

Another feature is an open architecture with a programmatic interface that accesses data control functions, so software subsystems can communicate directly with Measure.

For the Nonstop EXT-system, the initial license fee is \$1,500 per system, with a monthly license fee of \$100. For the Nonstop II and TXP systems, the initial license fee is \$3,000 per system, with a \$200 monthly fee.

Northern Telecom introduces its Meeting Communications System

Expanding the capabilities of its Meridian DV-1 voice and data system, Northern Telecom, Inc. unveiled a computer teleconferencing system and several workstations.

Northern Telecom's Meeting Communications System (MCS) allows up to 24 DV-1 users on the same local network to participate in a computer teleconference in which they speak to one another and share data. Callers from any outside telephone may also participate but without the data-sharing capability.

In addition, Northern Telecom introduced the Meridian 6000 series of workstations, consisting of the Meridian M6110, an IBM Personal Computer AT clone and the Meridian M6210, a multiuser workstation running Microsoft Corp.'s Xenix that can

support up to five asynchronous AS-II terminals.

The MCS teleconferencing system utilizes a screen illustration of a conference session. Icons representing the various participants are pictured around a rectangle representing a table or in a grid representing a classroom. Each participant may call up data or text and have it appear on the screens of the other conference participants.

Only two persons may converse at one time, although a third person may cut into the conversation. Voices are picked up by a microphone installed in each terminal.

DV-1 terminals range from \$5,000 to \$8,000. Adding the teleconferencing capability costs approximately an additional \$1,000 per terminal.

NEW PRODUCTS/SOFTWARE & SERVICES

SOFTWARE & SERVICES**Applications packages**

Tominy, Inc. has enhanced its **Mach 1** multiuser system generation facility said to produce portable application code for more than 20 different micro, mini and mainframe computers.

Enhancements include increased scope of programs generated automatically, ex-

panded programming logic commands, new screen scrolling functions and improved security sign-on procedures. It also includes enhanced editing and early error detection among development utilities.

Pricing for Mach 1 development licenses range from \$2,500 for a microcomputer to \$72,000 for an IBM mainframe. Runtime module licenses range from \$300 to \$4,000.

Tominy, 4221 Malsbury

Road, Cincinnati, Ohio 45242.

Languages

Cadam, Inc. has announced **Basicad**, a front-end software program to Cadam's Geometry Interface Module.

According to the vendor, Basicad is a Basic-like macro language designed to allow Cadam operators to write, debug and execute macros entirely at the IBM 5080

graphics screen or optionally on a 3270 alphanumeric terminal.

Basicad programs can be stored as Cadam modules so users can move between drawings and macros without leaving the scope, the vendor said.

Basicad operates in batch or interactive mode on both VM and MVS systems.

It costs \$11,500. Cadam, 1935 N. Buena Vista St., Burbank, Calif. 91504.

Utilities

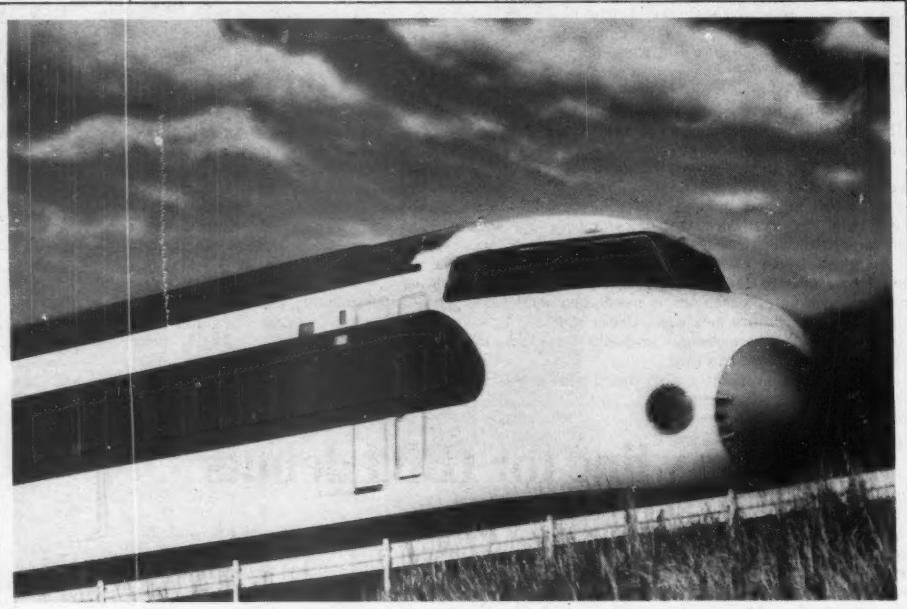
SDI has announced enhanced versions of its VSE disk and tape data set management products, **Reach** and **Epat**.

Release 6 of Reach is said to be totally shared-virtual-area-resident. Catalog-resident free-space tables allow the identification of free space with minimal volume table of contents interaction, allowing files to be allocated as quickly as possible.

Release 6.04 of Epat, SDI's tape management system, includes on-line access and update of the Epat catalog.

Reach costs \$7,050 or may be leased starting at \$260/month. Epat costs \$9,950 or \$300/month.

SDI, 1700 S. El Camino Real, San Mateo, Calif. 94402.



The time-honored philosophy behind our Tri Printer™



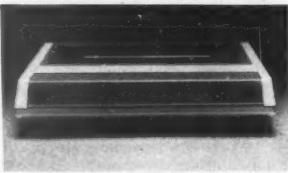
Odd, that a society which, on one hand honors tradition and deliberation, should, on the other hand pride itself on technology and speed.

Nowhere, perhaps, is this contradiction more obvious than in the famed Bullet Train's technological heir, the Tri Printer.

As its very name implies, the Tri Printer is three printers in one. With data processing, letter-quality word processing, and high resolution graphics capabilities.

But unadulterated speed is the one trait the Tri Printer is most famous for. At 350 cps in data processing mode and 87 cps in letter-quality mode, it is by far the fastest printer in its class. Such speed that you can turn out a higher volume of work in less time, increasing the efficiency of your business.

The Tri Printer is, quite honestly, a vast improvement over the very printers that IBM, Apple, and DEC make for



their own computers. In fact, we offer you many refinements and additions to their printers.

The Tri Printer works with all your software because it completely emulates the Epson FX-100, IBM Graphics Printer, DEC LA210, or Apple Imagewriter with a mere change of cartridge.

Finally, the Tri Printer is crafted to fit harmoniously into your office environment. For its low profile makes it as pleasant to the eye as its quiet operation makes it to the ear.

But its ultimate destiny is to be known for speed.

On the one hand, the speed with which it prints. On the other, the speed with which you should call us for more information.

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Technology Information Products Corp. has announced **Tip Plan It**, its automated support tool for information/entity modeling for IBM mainframes.

Tip Plan It is the interactive graphics software that automates the Tip Plan technology.

The **Tip Plan** enables business management and information system experts to develop a strategic information system plan to support a business area, according to the vendor.

Tip Plan It is intended to facilitate the entering, updating and maintaining of all the models, diagrams, matrices and supporting documentation.

Tip Plan is priced at \$60,000.

The price includes methodology, software, training and support.

Technology Information Products, 12 New England Executive Park, Burlington, Mass. 01803.

NEW PRODUCTS/MICROCOMPUTERS

MICROS**Systems**

Fujitsu Microsystems of America, Inc. has added the multiuser System 2020 to its Series 2000 family of Pick Systems' Pick-based business computers.

The System 2020 is powered by the 16-bit Intel Corp. 80286 microprocessor and can accommodate up to eight users.

The system offers standard memory of 512K bytes, expandable to 1M byte, and either 54M or 86M bytes of unformatted built-in hard-disk capacity.

Prices start at \$8,850 for a two-user System 2020 Model C, with 512K bytes of memory and 54M bytes of hard-disk storage.

Fujitsu, 3025 Orchard Pkwy., San Jose, Calif. 95134.

modules including a data base manager, a network extension edition and six accounting editions.

The IBM Accounting Assistant series is a set of six accounting programs that can function independently or as an integrated system.

The IBM Business Adviser accounting editions are priced at \$995 each. The data base manager costs \$225, while the network extension series costs \$245 per remote PC.

The IBM Accounting Assistant series editions are priced at \$595 each.

IBM, 900 King St., Rye Brook, N.Y. 10573.

■

Leonard Financial Planning Systems, Inc. has released TIPS, the Tax Investment Planning System, for use on IBM Personal Computers.

TIPS was designed to assist the income tax planning

or investment adviser in selecting, marketing and monitoring tax-advantaged investments.

The system offers screen modeling of income taxes and investment recommendations, a Help screen, function keys and two-dimensional cursor control.

TIPS is priced from \$995 to \$1,395.

Leonard Financial Planning Systems, Suite 400, 4600 Marriott Drive, Raleigh, N.C. 27612.

Computer Graphics Group, Inc. has announced Prograf, a graphics program for the IBM Personal Computer.

Prograf offers standard business charts as well as specialized charts. These specialized charts include ratio, decision, organization, loading, histogram and variance.

Prograf can combine different charts. It also lets users add free-form graphics

Continued on page 90

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CMI Corporation

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(313) 456-0000/TWX 810-232-1667

IBM has announced two series of accounting programs for IBM Personal Computers called the IBM Business Adviser and the IBM Accounting Assistant series.

The IBM Business Adviser is a set of eight integrated

NEW PRODUCTS/MICROCOMPUTERS

Continued from page 89
 and text anywhere on a chart. Charts can be customized by changing colors, patterns, line styles and borders. Up to 10 type fonts in 10 sizes are available. Up to eight colors can be used on a single graph.

Prograf is priced at \$149. Computer Graphics Group, 568 14th St. N.W., Atlanta, Ga. 30318.

Software Publishing Corp. has introduced PFS:Workmates, a permanent bundle of four PFS software programs for Apple Computer, Inc. Apple IIc and IIe computers using the Prodos operating system.

The four products are: PFS:Write, a word processing package; PFS:File, an electronic filing system; PFS:Report, which generates summary reports of PFS:File data; and PFS:Plan, a row-and column-oriented spreadsheet.

The PFS:Workmates bundle includes both 5½-in. and 3½-in. disks.

The PFS:Workmates bundle costs \$250. PFS:File and PFS:Report are available together for \$125.

Software Publishing, P.O. Box 7210, 1901 Landings Drive, Mountain View, Calif. 94039.

Software languages

National Instruments has announced support packages for Venturcom, Inc. Venix/86, IBM Xenix and Santa Cruz Operation, Inc. Xenix as well as language interfaces for True Basic, Inc. True Basic and Summit Software Technology, Inc. Better Basic.

The Venix/86 and Xenix software packages work with National Instruments, Inc.'s general-purpose interface bus (GPIB) personal computer hardware or the GPIB Adapter from IBM.

The software includes a handler and configuration and diagnostic utilities. It also includes an interactive control program.

The language interfaces for True Basic and Better Ba-

sic allow users to write programs that are able to communicate with the National Instruments GPIB personal computer hardware.

The Venix and Xenix support packages cost \$200.

The language interfaces cost \$50.

National Instruments, 12109 Technology Blvd., Austin, Texas 78727.

Virtual Systems, Inc. has

introduced its Microbench C language compiler.

Microbench C is said to produce optimized code for the Intel Corp. 8086 family of microprocessors.

Microbench C runs under Microsoft Corp. MS-DOS or IBM PC-DOS on the IBM Personal Computer or compatibles.

Its runtime library provides a set of Unix standard I/O services.

A separate library is provided for read-only memory

(ROM)-based applications, which include the source for a ROM-BIOS I/O interface.

Microbench C is priced at \$500.

Virtual Systems, Suite 406, 1500 Newell Ave., Walnut Creek, Calif. 94596.

computers.

According to the vendor, True Basic on the Macintosh allows access to 100% random-access memory as well as 98% of read-only memory-resident routines.

True Basic is a structured version of Basic that enables users to create, modify and maintain programs.

The Macintosh version of True Basic carries a price tag of \$149.

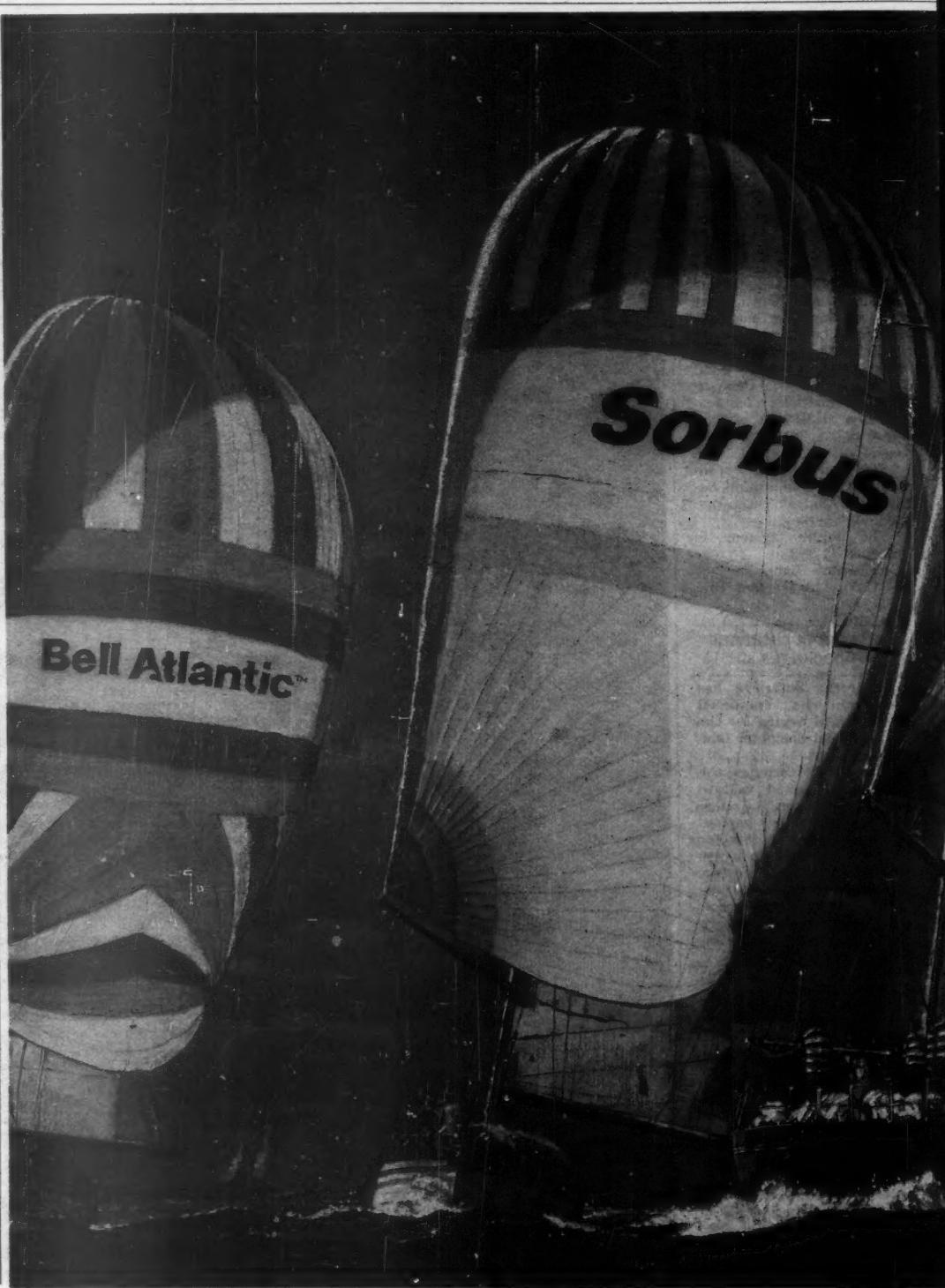
True Basic, 39 S. Main St., Hanover, N.H. 03755.

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Larkspur, CA 94939, Telex 176099

FUSION



NEW PRODUCTS/MICROCOMPUTERS

Software utilities

Goldata Computer Services, Inc. has announced **Save Our Spreadsheet**, a memory-resident software utility for the IBM Personal Computer and compatibles.

The utility is said to automatically, at regular intervals, save to disk Lotus Development Corp. 1-2-3 spreadsheets currently in random-access memory (RAM).

According to the vendor,

the length of time between saving to disk is user determined.

The program requires 2K bytes of RAM and is priced at \$29.95.

Goldata Computer Services, 2 Bryn Mawr Ave., Bryn Mawr, Pa. 19010.

Simpletec, Inc. has introduced **Diskview**, a disk manager for IBM Personal Computers and compatibles with

hard disks.

Diskview is said to allow users to survey all files on multiple disks present in the system and view the contents of any file. Users can also execute a program, copy, delete and rename files as well as format disks.

Diskview simplifies access to files in tree-structured directories. DOS commands are replaced by single-letter commands.

Diskview costs \$39. Simpletec, Suite 130, 1852

Century Place, Atlanta, Ga. 30345.

Personics Corp. has announced **Smartnotes**, a memory-resident software package for IBM Personal Computers said to allow users to attach notes to database records, spreadsheet cells, letters, memos and reports.

Users of **Smartnotes** can view the computer screen

with notes showing or can hide notes to reveal the text or numbers that the notes are covering. They can be attached anywhere within a computer document and do not alter the file or program in any way, the vendor states.

Smartnotes costs \$79.95. **Personics**, Building Two, 2352 Main St., Concord, Mass. 01742.

Intellution, Inc. has introduced **Fix Shell**, a multitasking environment for IBM's PC-DOS operating system.

The **Fix Shell** is an optional module for use with Intellution's integrated control system package, **The Fix**. It provides a user-configured master menu from which foreground and background programs are selected. In addition, it intercepts keyboard reboot commands.

According to the vendor, background and foreground programs run concurrently. Up to 16 background programs are supported.

A C language library is included.

The **Fix Shell** costs \$150. **Intellution**, 35 Perwol St., Westwood, Mass. 02090.

Software enhancements

Sydetech System Development Technologies has released Version 3 of **C-Display Utilities**, consisting of the **C-Display Compiler** and the **C-Display Librarian**.

The **C-Display Compiler** is a screen management utility said to allow users to design full screen and window display forms. It has editing capabilities and supports colors and character-generated graphics.

The **C-Display Librarian** is a library of C functions said to allow users to execute BIOS video services, perform virtual display management, create bit-mapped graphics and conduct interactive screen I/O.

The **C-Display Compiler** costs \$125. The **C-Display Librarian** costs \$145.

Sydetech, #17C, 43-23 Col-
den St., Flushing, N.Y. 11355.

Summagraphics Corp. has released Version 3 of its **Mactablet** graphics tablet software.

Continued on page 92

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NEW PRODUCTS/MICROCOMPUTERS

Continued from page 91

The software enables the user to shrink or enlarge drawings as they are traced for input into the Apple Computer, Inc. Macintosh. A viewpoint feature is offered that allows the user to control the size and location of the tablet's active area.

The Mactablet, with software, costs \$395.

Summagraphics, 777 State St. Extension, Fairfield, Conn. 06430.

Sinper Corp. has announced Release 2 of TM/1, business analysis software for the IBM Personal Computer, Personal Computer AT, compatibles and the Wang Laboratories, Inc. Professional Computer.

Release 2 is said to feature network support, expanded documentation, enhanced ease of use and more powerful analytical capabilities than the previous version.

TM/1 is intended for users requiring data tables such as those doing financial analysis and budgeting, market research and sales analysis and industry analysis.

TM/1 Release 2 costs \$795.

Sinper, 8901 Tonelle Ave., North Bergen, N.J. 07047.

Attachmate Corp. has released Version 2.5 of its 3270-PC Emulation Program.

The program runs with Attachmate's 3-N-1 Coax Adapter. It is said to feature support for IBM's 3270 Personal Computer Applications Program Interface, support for extended keyboards such as the Keytronic Corp. KB3270/PC, enhanced graphics adapter support and a cursor select function.

According to the vendor, the 3-N-1 Adapter is hardware and software compatible with both the Irma board from Digital Communications Associates, Inc. and IBM's 3278 and 3279 Coax Adapter.

The 3-N-1 Coax Adapter with Version 2.5 costs \$1,195.

Attachmate, 3241 118th S.E., Bellevue, Wash. 98005.

Softstyle, Inc. has released Version 2.1 of its Printworks for Lasers software for IBM Personal Computers and compatibles.

Printworks for Lasers 2.1 offers memory-resident typesetting functions and support for three additional laser printers. New functions include 26 built-in laser printer typefaces, six downloaded fonts, 26 foreign language and mathematical symbol sets, six pitches and four special shadings.

The three new printers supported are Hewlett-Packard Co.'s LaserJet 500 Plus, Xerox Corp.'s 4045 Laser CP and NCR Corp.'s 6416, according to the vendor.

Printworks for Lasers Version 2.1 costs \$125.

Softstyle, Suite 205, 7192 Kalanianaole Highway, Honolulu, Hawaii 96825.

Industrial Vision Systems, Inc. has announced E/Mage Version 2, software said to display optically scanned hard copy on personal computer screens.

According to the vendor, both text and graphics appearing on the paper are displayed on the screen. The software can handle large documents, such as those 3 ft by 4 ft, as well as small documents.

E/Mage software is licensed on a site basis. According to the vendor, the basic license cost is \$1,000 for up to five workstations.

Industrial Vision Systems, 452 Chelmsford St., Lowell, Mass. 01851.

as well as unlimited backward and forward document scrolling and searching.

Other features include alphabetic and numeric text sorting for lines and columns, arbitrary sorting of mass mailing runs, menu-driven system configuration and improved Help screens.

LEX is priced between \$500 and \$1,000.

Softest, 555 Goffle Road, Ridgewood, N.J. 07450.

U.S. counties in memory while the program is running.

According to the vendor, the software supports a range of data base and word processing programs including Lotus Development Corp.'s 1-2-3 and Micropro International Corp.'s Wordstar. The product also includes a dictionary of 72,000 cities and towns.

The base version of Map Builder costs \$250. Optional boundary files cost \$50 for five regions.

Geosoft, 38 Park St., Vernon, Conn. 06066.

West End Film, Inc. has added texture-mapping to its Artwork software package for IBM Personal Computers and compatibles.

Artwork, part of the Artwork En-

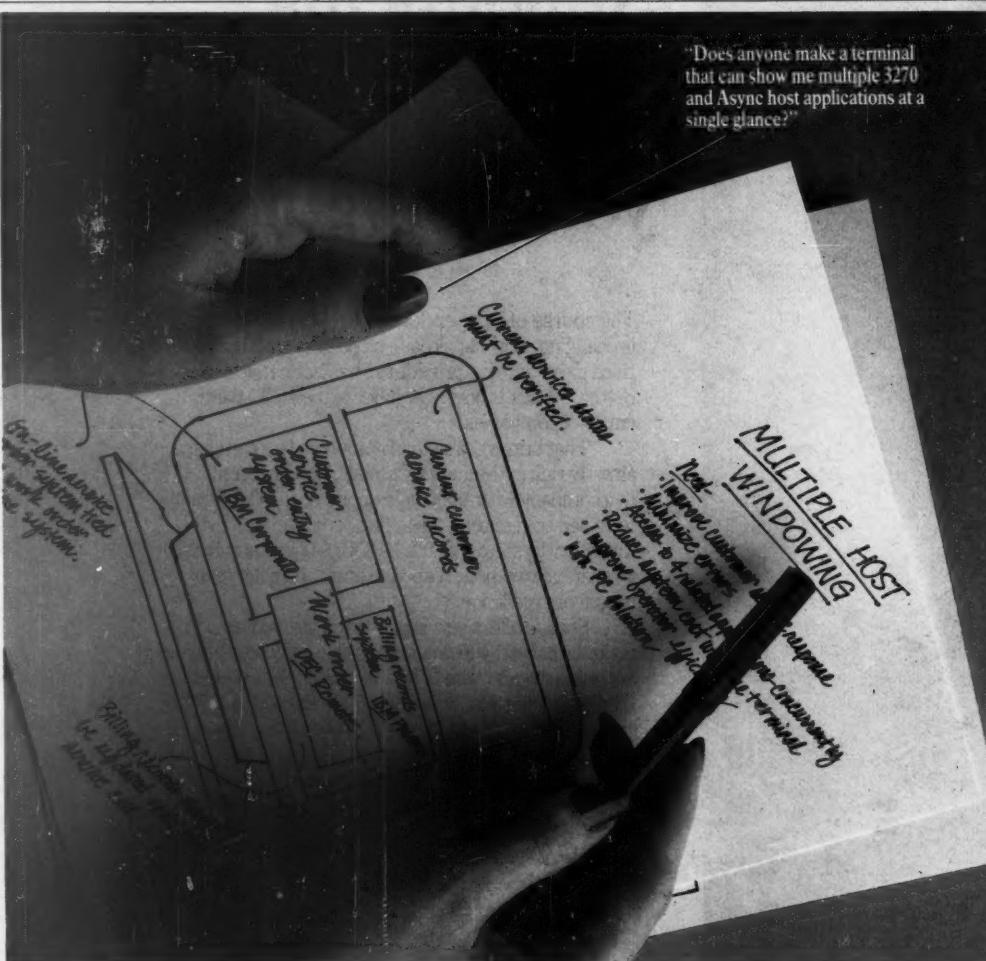
Softest, Inc. has announced LEX Release 9.

LEX is a word processor for Unix, Microsoft Corp.'s Xenix and MS-DOS systems. According to the vendor, Release 9 contains automatic footnoting, on-screen underlining and emboldening, predefined printer forms

Geosoft Corp. has announced Release 2 of its Map Builder product for creating custom color maps on IBM Personal Computers and compatibles.

Map Builder is said to keep all the boundary data for more than 3,000

"Does anyone make a terminal that can show me multiple 3270 and Async host applications at a single glance?"



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Tired of accessing multiple applications the hard way...one at a time? Lee Data's new Open Window™ display, the "no PC" approach to windowing, lets you view up to four "live" 3270 and Async host applications. On the same screen. At the same time. The easy way.

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NEW PRODUCTS/MICROCOMPUTERS

vironment of graphics programs, is a display list drawing program for three-dimensional drawing.

Texture-mapping is a technique used to wrap two-dimensional painted or scanned-in images onto 3-D objects.

Artwork Environment software is priced in a range from \$750 to \$2,500.

West End Film, 1825 Q St. N.W., Washington, D.C. 20009.

Chang Labs has introduced **Fileplan Version 4**, a sales management data base system for IBM Personal Computers and compatibles.

According to the vendor, Fileplan will print letters, envelopes and mailing labels, customize and personalize form letters as well as manage fol-

low-up schedules.

Additionally, it will track call reports and telephone logs, quota goals and commissions and expense reporting and tickler systems, according to the vendor.

Features include spreadsheet and forms mode, color coding and upward compatibility with Ashton-Tate's Dbase III.

The cost of Fileplan Version 4 is \$199.95.

Chang Labs, 5300 Stevens Creek Blvd., San Jose, Calif. 95129.

and PDP-11 computers.

According to the vendor, Vterm III combines VT100 terminal emulation, multiprotocol file transfer and asynchronous communications capability up to 19.2K bit/sec.

Vterm III costs \$195. Users of Vterm II can upgrade for \$70.

The cost of Vterm III with CT100 and Tektronix, Inc. 4010 terminal emulation is \$249.

Coefficient Systems, 611 Broadway, New York, N.Y. 10012.

of computer-based training and interactive videodisk to have 640 by 200 pixel graphics with full capabilities including free-hand sketch, 80- and 40-col. text and 16 colors, according to the vendor.

The enhanced MIC System 2000A costs \$1,950. The EGA card is not included. The cost to license SAM starts at \$3,500 for the first year.

Learcom, 215 First St., Cambridge, Mass. 02142.

Morgan Computing Co. has released **Version 2.2** of **Advanced Trace86**, offering an assembly language interpreter including a full-screen symbolic debugger.

Advanced Trace86 features the ability to trace .EXE or .COM programs in disassembled format with labels and variable names scanned from the .MAP file.

While single-step tracing, the user can see all the registers and flags, the stack and a portion of the memory, according to the vendor.

Users of Advanced Trace86 can set break points and skip over code at native speed. In addition, users can watch memory contents accessed and changed and flip to a special screen save window.

The cost of Advanced Trace86 Version 2.2 is \$175.

Morgan Computing, P.O. Box 112730, Carrollton, Texas, 75011.

Pick Systems has announced **Release 2** of the **Pick operating system** for the IBM Personal Computer XT.

Release 2 includes the ability to extract formatted data directly from Pick/BASIC via the Execute command and support of streaming-cartridge tape backup.

According to the vendor, it also provides a data-transfer bridge between files created under the Pick and Microsoft Corp. MS-DOS operating systems. An application generator has also been added.

Release 2 supports the Western Digital Corp. disk controller, the IBM 3161/3162 and Esprit Systems, Inc. terminals and three additional parallel ports.

Release 2 of the Pick operating system costs \$495.

Pick Systems, 1691 Browning, Irvine, Calif. 92714.

Communications

Codenoll Technology Corp. has announced its Codenet-3050 IBM PC Network Fiber Optic Transceiver/Adapter and its Codenet-3550 Fiber Optic Backbone System.

The 3050 converts any IBM PC Network adapter card from a broadband, coaxial local-area network to a fiber-optic, local-area network.

The 3550 is said to attach a fiber-optic transceiver to the Intel Corp. 82586 and 82186 coprocessors and NetBIOS interface on the PC Network adapter card, providing a means for interconnecting up to 32 IBM Token-Ring networks and PC Networks.

The standard 3050 is for network clusters with up to 16 Personal Computers. The high-power model is for clusters with up to 64 PCs.

They cost \$495 and \$750, respectively. The basic Codenet-3550 adapter kit starts at \$895.

Codenoll Technology, 1086 N. Broadway, Yonkers, N.Y. 10701.

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NEW PRODUCTS/MICROCOMPUTERS

Complementary Solutions, Inc. has announced Telemate, a personal computer software product said to manage phone calls.

Telemate lets Microsoft Corp. MS-DOS and IBM PC-DOS computers become data collection devices to capture an organization's phone activity at the same time as other programs are being used. It contains a phone directory and reporting system. Options available include a custom report writer and a system for calculating the cost of each phone call.

Telemate is priced between \$495 and \$1,195.

Complementary Solutions, Suite 317, 4470 Chamblee-Dunwoody Road, Atlanta, Ga. 30338.

Racore Computer Products, Inc. has introduced the Lanpac, a ring concept local-area network for IBM Personal Computers and compatibles.

Lanpac consists of proprietary local-area network ring architecture on a plug-in network interface card. It is said to transfer data at the rate of 2M bit/sec.

Lanpac can link up to 250 stations in any combination, with up to 1,000 ft between nodes.

Basic Lanpac costs \$295 per node. **Racore Computer Products, 10 Victor Sq., Scotts Valley, Calif. 95066.**

Cbis, Inc. has introduced a twisted-pair wire interface for its Network-OS series of local-area network operating systems for the IBM Personal Computer, Personal Computer XT, AT and compatible microcomputers.

According to the vendor, the interface will allow Network-OS to transfer data at 2.25M bit/sec. It also offers an open-bus structure said to provide easier integration of multiple workstations.

The twisted-pair wire interface costs \$395.

Cbis, 2323 Cheshire Bridge Road, Atlanta, Ga. 30324.

ESI has announced a Wang Laboratories, Inc. Professional Computer version of its Micropulse host/microcomputer information retrieval system.

Micropulse is said to provide multi-user access for the Wang Professional Computer in native mode to data stored on all Burroughs Corp. mainframes, including the V and A series. It allows the micro user to access mainframe data in a secure, controlled environment.

According to the vendor, Micropulse provides management of the host environment.

Micropulse for the Wang Professional Computer is priced from \$22,000 to \$35,000, depending on the host system.

ESI, 3200 Commonwealth Blvd., Tallahassee, Fla. 32303.

Microsoft Corp. has released Microsoft Access Version 1.01.

Access is said to offer a menu system for information and electronic mail services, a built-in language and the capability for hooking up to multiple sources. It also includes conver-

sion utilities for application programs as well as personal computer-to-mainframe and PC-to-PC communications.

Version 1.01 of the business information access program for electronic communications includes updated custom menus, a new installation feature for hard disks, speed enhancements and non-copy-protected disks.

Microsoft Access is priced at \$250. Registered owners of Microsoft Access will receive the new version free.

Microsoft, Box 97017, 1601 N.E. 36th Way, Redmond, Wash. 98073.

Eikonix Corp. has announced an interface package for its digital imaging cameras said to allow IBM Personal Computers and compatible sys-

tems to act as host computers for storing, retrieving and manipulating image information.

The package consists of an IEEE 488 card and a customized PC interface card connected by a 12-ft cable. One card is installed in the camera's electronic support unit, the other in the host computer.

The package enables the Eikonix Series 78/99, Series 850 and E-Z Scan Model 4334 digital imaging systems to transmit data to microcomputers at a rate of up to 1M bit/sec.

The package costs \$2,500.

Eikonix, 23 Crosby Drive, Bedford, Mass. 01730.

Network Software Associates, Inc. has announced a version of its Adaptsna PC Com product, a Syn-

chronous Data Link Control (SDLC) personal computer-to-personal computer communications link for the IBM Personal Computer, Personal Computer XT, AT and compatibles.

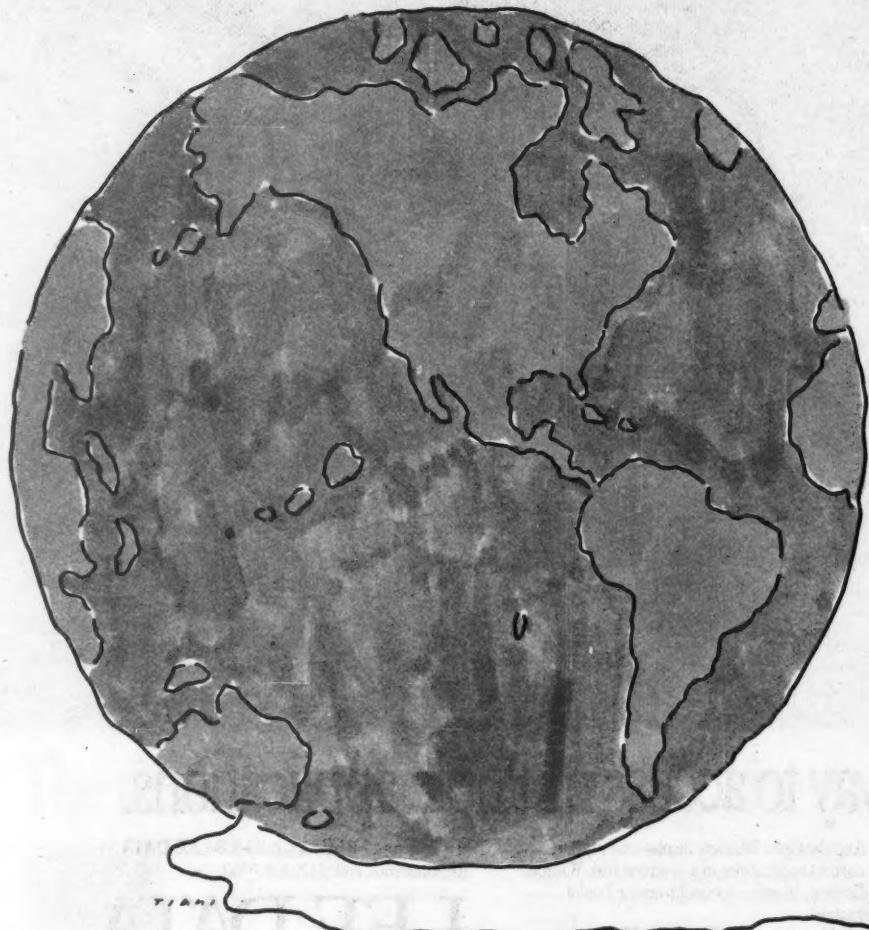
The product is said to operate at speeds up to 19.2K bit/sec. It features automatic operation, remote control, automatic dialing and call directory.

The software-only version requires 128K bytes of memory, IBM's SDLC adapter board and a synchronous modem.

A software-hardware configuration adds the company's Adaptnet. An alternate software-hardware version uses Network Software's Adaptnet board, an SDLC adapter and an external modem.

The software-only version costs \$475, the PC Com-Adaptnet combination costs \$1,270 or \$720 with

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Microsoft Corp. has released Microsoft Access Version 1.01.

Access is said to offer a menu system for information and electronic mail services, a built-in language and the capability for hooking up to multiple sources. It also includes conver-

NEW PRODUCTS/MICROCOMPUTERS

PC Com-Adaptcom.
Network Software Associates,
22982 Mill Creek, Laguna Hills, Calif.
92653.

Softronics, Suite 210, 7899 Lexington Drive, Colorado Springs, Colo. 80918.

Softronics, Inc. has announced a new version of its **Softterm** PC data communications product.

The new version is said to offer a seamless file transfer feature. According to the vendor, the file transfer process does not interrupt application programs.

Softterm PC is currently bundled with Oneshot, a program from Dataviz Corp. said to enhance Softterm PC's micro-to-mainframe capabilities by providing format conversion from ASCII text files to any of seven PC formats.

Softterm PC is priced at \$195.

AST Research, Inc. has introduced the **AST-5250/Asyne Dialup** package said to enable a remote IBM Personal Computer, Personal Computer XT, AT or compatible to communicate asynchronously with an IBM minicomputer.

The package is said to provide AST 5251 Model 11 display terminal emulation. The AST 5251 Model 11 series products provide personal computers with local attachment to IBM System/34, System/36 and System/38 hosts via standard twin-axial cable.

The package includes facilities for bidirectional file transfer and a hot

key for switching between concurrent IBM PC-DOS and host sessions.

The **AST-5250/Asyne Dialup** package costs \$395.

AST Research, 2121 Alton Ave., Irvine, Calif. 92714.

frame protocol conversion software, is installed on the host, a DG/One can emulate a 3270-type terminal.

Single copy prices are \$250.

Simware, Suite 100, 14 Concourse Gate, Nepean, Ont., Canada K2E 7S6.

Network Software Associates, Inc. has introduced **Adaptmodem/ACC**, an enhanced version of its **Adaptmodem**, a combination synchronous modem and Synchronous Data Link Control communications adapter for IBM Personal Computers.

Adaptmodem/ACC, a full-slot expansion board including an on-board AT&T 201-compatible 2,400 bit/sec. synchronous modem, is said to incorporate the vendor's Automatic Call Control (ACC) facilities. ACC provides call control features including autodial, autoanswer, redial, a 180-entry call directory, automatic phone-line and modem testing plus modem configuration options.

The **Adaptmodem/ACC** package costs \$795.

Network Software Associates, 22982 Mill Creek, Laguna Hills, Calif. 92653.

Multi-Tech Systems, Inc. has introduced **Multimodem PC3**, a half-card 1,200/300 bit/sec. modem for the IBM Personal Computer, Personal Computer XT, AT and compatibles.

The **Multimodem PC3** is an asynchronous communications device. It features Hayes Microcomputer Products, Inc. AT command set compatibility, autodial and autoanswer, two phone jacks, a built-in speaker and half- or full-duplex operation. It offers a 20-phone-number directory.

The **Multimodem PC3** costs \$299 including all hardware, communications software and phone cable.

Multi-Tech Systems, 82 Second Ave. S.E., New Brighton, Minn. 55112.

Micom Systems, Inc.'s Micom-Interlan has announced the **NI5010 Data Link Controllers**, said to allow IBM Personal Computers, Personal Computer XT and ATs to participate in Digital Equipment Corp. Decnets.

The **NI5010** interfaces the IBM PCs and compatibles to Ethernet local-area networks, providing 10M bit/sec. communications. DEC's Decnet-DOS software provides protocol supports.

Two versions are available. One includes an on-board transceiver for thin-cable Ethernet. The other provides an IEEE 802.3-standard transceiver. They are priced at \$650 and \$550, respectively.

Micom Systems, P.O. Box 8100, 4100 Los Angeles Ave., Simi Valley, Calif. 93062.

Packet/PC, Inc. has added VM/VTAM and IBM 3708/3710 support to its **Packet/3270**, the IBM Personal Computer Systems Network Architecture (SNA)/asynchronous communications link.

Packet/3270 is said to support all major SNA 3270 applications including IBM's CICS, IMS, TSO, and Distributed Office Support System and internally written applications.

Continued on page 99

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AT&T PC 6300
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But you can also make contact with a great many more — 687,300, to be specific. In the three issues surrounding NCC, Computerworld will give extensive, in-depth coverage of this major event. Our Preview issue of June 9, chock-full of product announcements and information, offers a great opportunity to tell those planning to attend where your exhibit can be found. And it offers an opportunity to tell those who won't be there about your products.

Our Show issue of June 16,

containing still more product information, will be distributed by the thousands from our booth at NCC. It's your chance to make nonattendees part of the show — and your exhibit.

And our June 23 Wrap-up issue will take a close look at what happened at NCC. Plus, it gives you a chance to reinforce your NCC message after the show.

So don't miss this opportunity to extend your NCC program far beyond Las Vegas — and into offices — with the help of Computerworld and these three special issues.

Call your Computerworld representative today to reserve your space in these NCC issues. Or call Ed Marecki, Vice President/Sales, at (617) 879-0700.

ISSUE	NCC Preview	NCC Show	NCC Wrap-up
ISSUE DATE	June 9	June 16	June 23
COLOR CLOSING	May 23	May 30	June 6
B/W CLOSING	May 30	June 5	June 13

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NEW PRODUCTS/MICROCOMPUTERS

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At the PC, Packet/3270 requires IBM PC-DOS or Microsoft Corp. MS-DOS, 128K bytes of memory and an asynchronous communications adapter. At the host, MVS support requires VTAM Version 2; VM support requires VTAM Version 3.

The host license is \$7,500, and the PC license ranges from \$145 to \$295. Packet/PC, 270 Farmington Ave., Farmington, Conn. 06032.

Anchor Automation, Inc. has announced the **Signalman Lightning**, a 2,400 bit/sec. autodial, add-in board modem for the IBM Personal Computer family and compatibles.

The half-card modem operates asynchronously. It has an automatic equalizer and fallback to 1,200 or 300 bit/sec. It comes bundled with Lync communications software from Norton-Lambert, Inc., providing three modes of operation, a range of modem control commands, data transfer features, password security and diagnostics.

The Lightning is priced at \$499. Anchor Automation, 6913 Valjean Ave., Van Nuys, Calif. 91406.

At-Eze, Inc. has announced **Shadow**, a product said to allow a master system to take over any off-site IBM Personal Computer or compatible and to provide full local-area network access.

Shadow displays and uses all standard IBM characters, graphics characters and attributes. On-screen instructions can be supplemented with voice. Software can be installed, modified, updated and transferred in both directions. Shadow can also be used to run software on any installation from any installation in the communications network.

Shadow is priced at \$149.95. At-Eze, 418 Kings Way, Mundelein, Ill. 60060.

Samna Corp. has announced versions of its **Samna Word III** and **Samna+** software programs tailored for microcomputer systems connected by the IBM PC Network.

Samna Word III features spelling correction, automatic table of contents and index generation, among other features. Samna+ combines word processing with a spreadsheet and Wordbase Manager, a function that locates words and phrases within Samna files. The software is said to offer users access to an expanded selection of multiple printers.

Prices for Samna Word III range from \$1,250 for a three-user system to \$11,000 for a 30-user system. Samna+ ranges in price from \$1,550 to \$13,850.

Samna, Suite C-700, 2700 N.E. Expwy., Atlanta, Ga. 30345.

Data storage

First Class Peripherals has introduced the **B-Sider**, a tape backup system that works with its Winchester hard-disk subsystems, the Sider and Sider II and the Apple Computer, Inc. Apple IIe and II+ computers.

The B-Sider backs up either the 10M-byte Sider or 20M-byte Sider II. It features a 20M-byte streaming cassette tape. The backup unit shares

the host adapter and bus with the Siders.

The B-Sider is priced at \$695. First Class Peripherals, 3579 Highway 50 E., Carson City, Nev. 89701.

Printers/Plotters

Microvitec, Inc. and **Ultra-graphics Corp.** have announced the **Microvitec Definition 895 DU** color graphics monitor and the **Ultragraph 800** graphics and text card.

Designed to work together, the products are said to provide a business graphics or computer-aided design system with flicker-free resolution of 800 by 400 pixels in 16 colors on an IBM Personal Computer or Personal Computer AT.

The Definition 895 DU monitor has a 14-in., high-contrast, antiglare

Continued on page 102

the host adapter and bus with the Siders.

The B-Sider is priced at \$695.

First Class Peripherals, 3579 Highway 50 E., Carson City, Nev. 89701.

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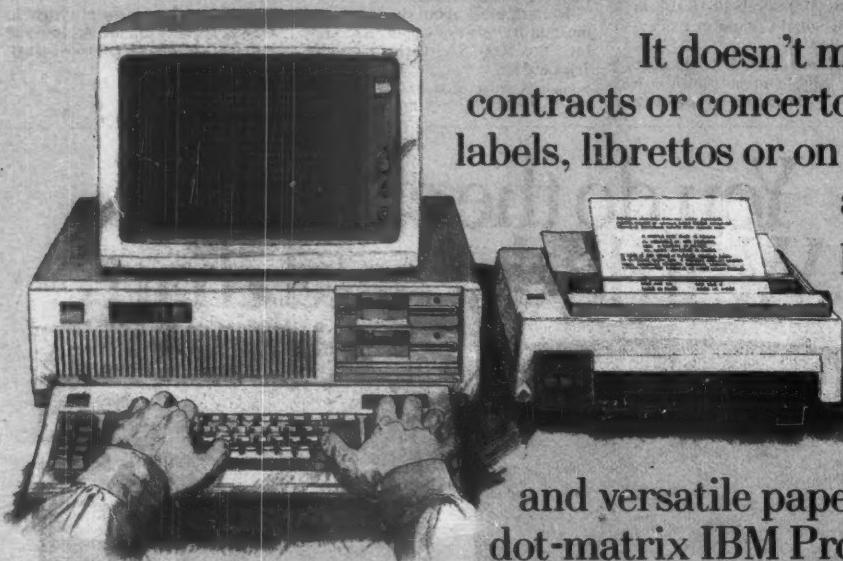
*California residents add 6.0% sales tax (\$6.00); Washington state residents add 8.1% sales tax (\$8.10). Offer expires July 31, 1986. Please allow 6 weeks for delivery. Tutorial and demonstration software for IBM® Personal Computers and compatible only. Offer good only in U.S.A.

CW3

Microsoft Project runs on many computers that use the MS-DOS® operating system.

Microsoft and MS-DOS are registered trademarks and The High Performance Software is a trademark of Microsoft Corporation. IBM is a registered trademark of International Business Machines Corporation.

Now there's an IBM personal printer that can play whatever you compose.



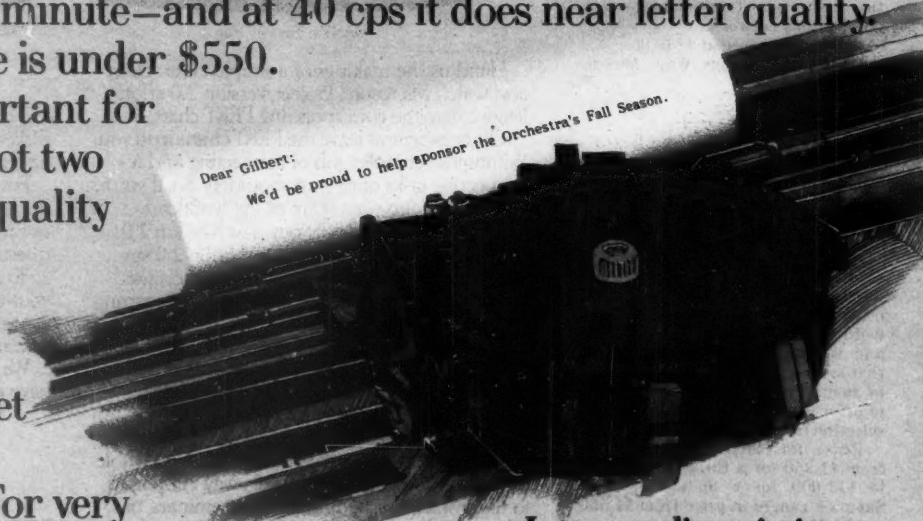
It doesn't matter if you're writing contracts or concertos; whether you print labels, librettos or on letterheads—IBM has a personal computer printer that is perfect for your needs.

If you're looking for speed, all-points-addressable graphics and versatile paper handling, there's the dot-matrix IBM Proprinter. For drafts it does up to 200 characters per second (cps)

—about three pages a minute—and at 40 cps it does near letter quality. Surprisingly, the price is under \$550.

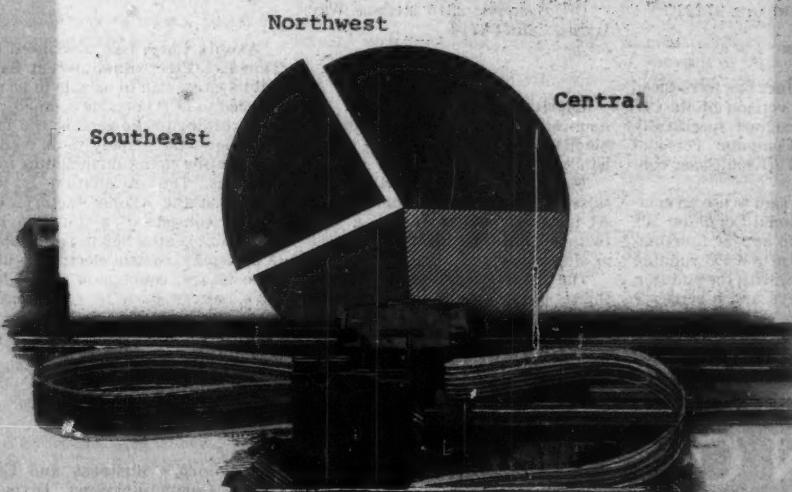
If letters are important for your business, we've got two extraordinary letter-quality machines. The IBM Quietwriter® Printer gives you high-quality printing, whisper-quiet operation and high-resolution graphics. For very sharp letter quality, easy paper handling and carbon copies, there's the IBM Wheelprinter.

Dear Gilbert:
We'd be proud to help sponsor the Orchestra's Fall Season.



Letter-quality printing

Ticket Sales



Text and color graphics

When your compositions call for color you can call upon the brilliance of the Color Jetprinter from IBM. It combines splendid color, near-letter-quality text and the capacity to work—in color—with a wide range of the latest software. And it's also all

points addressable for virtually any kind of graphics.

Lastly, if you really do need to put notes on paper—or print floor plans or other complex diagrams—IBM offers a choice of high-resolution color plotters.

All of our personal printers attach to IBM PCs, and many attach to other leading personal computers as well. They're all designed to serve a single purpose: To give everything you do the finishing touch.

For the authorized IBM dealer or the IBM Product Center nearest you—or for free literature—call 1 800 IBM-2468, Ext. 90/LR. Or contact your IBM marketing representative.



Plotter graphics

IBM

IBM Personal Printers...The Finishing Touch

NEW PRODUCTS/MICROCOMPUTERS

Continued from page 99
screen. It costs \$895.

The Ultragraph 800 card emulates an IBM Color Graphics Adapter. It costs \$995.

Microvitec, 1943 Providence Court, Airport Perimeter Business Center, College Park, Ga. 30337.

Computer Friends, Inc. has announced **Proteus**, a parallel double buffer and data switch.

Proteus is said to incorporate a buffer on each of the two output ports; a data switch, either via front panel, manual control or via software; and multiple-copy capability on both ports. It is said to allocate as much memory as is available at any one time to each output port.

Proteus costs \$199 for the 64K-

byte version and \$299 for the 256K-byte version.

Computer Friends, 6415 S.W. Canyon Court, Portland, Ore. 97221.

supports both RS-232C and RS-422 interfaces.

The CIE 7102 costs \$795.

CIE Systems, 2515 McCabe Way, Irvine, Calif. 92714.

Esprit Systems, 100 Marcus Drive, Melville, N.Y. 11747.

Axonix Corp. has announced the **Thin E/L Electroluminescent Backlight** system said to be able to be retrofitted to LCD portable computers.

According to the vendor, the Thin E/L allows the display to be read in any lighting condition including total darkness. The installation is performed at the Axonix factory. The retrofit consists of a thin-film E/L panel that is attached to the existing LCD display, control electronics and, if necessary, conversion of the laptop's battery back to rechargeable Nicads.

Prices range from \$200 to \$350 depending on the computer model.

Axonix, 417 Wakara Way, Salt Lake City, Utah 84108.

ITT Corp.'s Business and Consumer Communications Division has announced a line of **four printers** designed to meet user need for attached peripheral devices and for shared resources.

The printers are part of the ITT System 3100 voice/data private automatic branch exchange product line.

The four printers are the ITT 182 dot matrix personal printer; the ITT 192 dot matrix; the ITT 193 wide carriage and the ITT Qume Letterpro 20. Prices are \$399, \$599, \$750 and \$649, respectively.

ITT, 6131 Falls of the Neuse Road, Raleigh, N.C. 27609.

New Media Graphics Corp. has announced the **TS-2012 monitor** for use with its PC-Graphover system.

The 12-in. color monitor is said to offer a fully integrated touch screen. It displays red-green-blue analog signals and is capable of screen resolutions of 640 by 400 pixels.

The TS-2012 is priced at \$1,690.

New Media Graphics, 279 Cambridge St., Burlington, Mass. 01803.

Menlo Business Systems, Inc. has announced **Mac Menlo**, a software product said to allow the Apple Computer, Inc. Macintosh to be used as a Tandem Computers, Inc. terminal or a Lear Siegler, Inc. ADM2 terminal.

Mac Menlo includes facilities to transfer text and graphics to and from the host computer and allows users to record on-line sessions as Macintosh documents.

It costs \$395 per terminal.

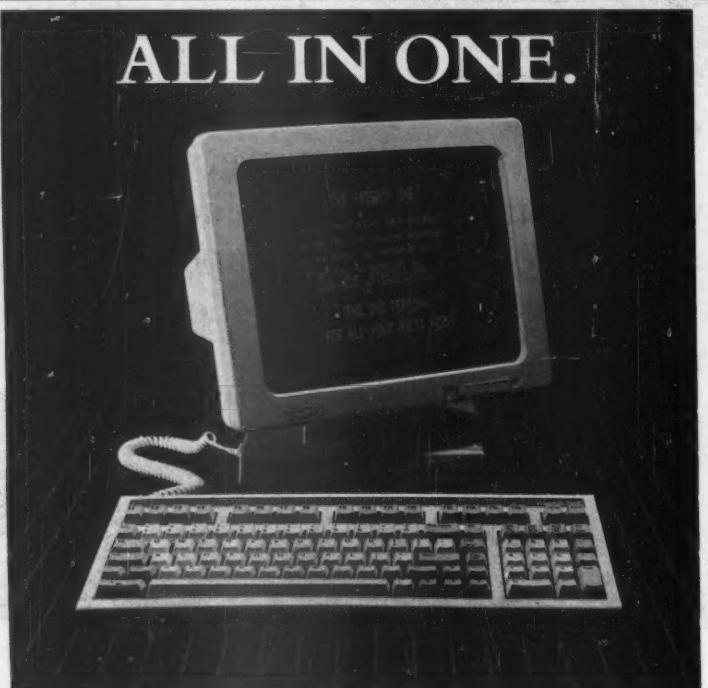
Menlo Business Systems, 334 State St., Los Altos, Calif. 94022.

Tab Products Co. has introduced the **Systems-Plus**, a microcomputer designed to increase the intelligence of the Tab family of terminals and Digital Equipment Corp. VT100 and VT220 terminals and clones.

The **Systems-Plus** will run IBM Personal Computer XT programs. The terminals function as the keyboard and the monitor of the microcomputer as well as the terminal on the existing network.

Prices start at \$1,195.

Tab Products, 1400 Page Mill Road, Palo Alto, Calif. 94304.



Introducing the Freedom ONE from Liberty Electronics

The Freedom ONE is the one terminal for all of your ASCII needs. With the Freedom ONE you don't pay more for advanced features. With the Freedom ONE you don't sacrifice features just because you pay less. At \$449 the Freedom ONE gives you the best of all worlds—in one terminal.

The Freedom ONE is designed to be there with all the features you need whatever your application. A 14-inch flat screen gives you the ultimate in crisp, clear characters in either 80 or 132 column display formats. Popular emulations like Freedom 200, WY-50, Viewpoint A2, TeleVideo 950, and ADM 31 let you fully utilize all

your existing applications programs. An adjustable height keyboard with 44 easy to program keys (88 with shift) lets you tailor the key layout and functions to your liking. Compact and attractive styling gives your workspace a state-of-the-art look with room to spare. These are just a few of the no-compromise, unbeatable features you get standard with the Freedom ONE.

For more information call Liberty Electronics today (415) 543-4353, and ask for it all. Ask for the ONE.

Liberty
We Make Terminals

NEW PRODUCTS/MICROCOMPUTERS

Bren Instruments, Inc. has announced the 82BC series of multifORMAT label design, store and print systems.

The 82BC series uses a portable lap computer with built-in, read-only memory software for label create and store. It has a print control program that allows the printing of one label on demand or batch printing.

The systems offer speeds from 160 to 350 char./sec., 10 standard bar codes and 15 character heights.

Complete systems range in price from \$2,400 to \$5,000.

Bren Instruments, 308 Century Court, Franklin, Tenn. 37064.

Amdek Corp. has announced its Color 730 analog red-green-blue color or monitor, which is said to be compatible with the IBM Professional Graphics Adapter.

The monitor can display 256 colors at a time, selected from a palette of 4,096. It has a nonglare etched-glass CRT with up to 720 by 480 pixel resolution.

The Amdek Color 730 is priced at \$1,099.

Amdek, 2201 Lively Blvd., Elk Grove Village, Ill. 60007.

GrafTel, Inc. has introduced the VP 210, a color video processor said to process graphics from a computer screen in 64 colors.

The GrafTel processor is said to transfer the entire display to almost

any color printer or plotter through the use of built-in firmware.

The VP 210 features a 1M-byte or 2M-byte buffer and a 60 MHz data rate. It can accept graphics from screens with resolutions up to 1,280 by 1,040 pixels.

The VP 210 costs \$2,995 for the IBM-compatible model and \$3,495 for the 2M-byte version.

GrafTel, 400 Executive Blvd., Executive Park, Elmsford, N.Y. 10523.

OkiData Corp. has announced two dot matrix printers, the Microline 292 and the wide-carriage Microline 293.

According to the vendor, both printers are rated at 200 char./sec. in utility mode and single-pass 100 char./sec. in near-letter-quality mode. They operate with IBM and IBM-compatible personal computers.

The Microline 292 is priced at \$699, and the wide-carriage Microline 293 is priced at \$899.

OkiData, 111 Gaither Drive, Mount Laurel, N.J. 08054.

Recognition Technology, Inc. has announced the RTIstation, an intelligent vision subsystem for the IBM Personal Computer family.

The RTIstation is a hardware and software front end for all vision steps including image acquisition, image storage and image processing.

The system is composed of three hardware components: the PX-501M,

a 16-bit fixed-point pixel processor; a module for digitizing the incoming video output; and a module for image storage.

The RTIstation is priced from \$14,500 to \$20,000.

Recognition Technology, 335 Fiske St., Holliston, Mass. 01746.

Computone Systems, Inc. has announced Ramvantage, a semiconductor-disk capability for the IBM Personal Computer AT and compatibles running Santa Cruz Operations, Inc.'s System V or IBM System 3 Xenix.

Each Ramvantage board uses a slot in the IBM PC AT bus and provides 3M bytes of random-access memory disk capability. According to the company, up to four Ramvantage cards may be installed to provide up to 12M bytes of storage.

Ramvantage is priced at \$1,195.

Computone Systems, Suite 200, 1 Dunwoody Park, Atlanta, Ga. 30338.

Auxiliary equipment

Inmac has announced the Easy Access Buffer printer buffer and the Power Director.

The Easy-Access Buffer was designed to allow access to a computer during printing. Both serial and parallel versions store up to 64K bytes of text. Memory can be expanded to 256K bytes.

Up to five components can be plugged into the Power Director. Each component can be powered up, or a master switch can power up the

whole system. Four versions are available: with storage slot; with three-device, 25-line T-switch; with three-device, 36-line T-switch; and with 64K-byte print saver.

The Easy-Access Buffer costs \$369. The Power Directors range from \$169 to \$429.

Inmac, 2465 Augustine Drive, Santa Clara, Calif. 95054.

COMMUNICATIONS

Controllers

Astrocom Corp. has announced the Astrocom Easy II Manager, a device for operator-controlled switching of data on IBM 3270 systems.

The Manager allows 3270 Class A terminal operators to have access to up to three IBM 3274 controllers on a session basis. It is used in conjunction with Astrocom's Squeezplexer coaxial multiplexer products.

Features include balancing of controller loading, providing controller access on a contention basis, expanding of a system without recabling and access to multiple computer systems via local or remote controllers.

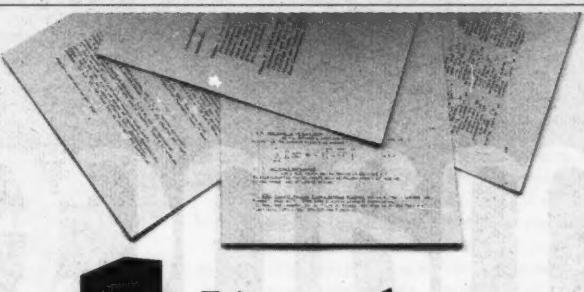
The Easy II Manager is priced from \$3,415.

Astrocom, 120 W. Plato Blvd., St. Paul, Minn. 55107.

Voice/data communications

Equatorial Communications Co. has introduced Private Newswire, which is a message generation and

Continued on page 106



It's simply
the most
sophisticated
word processing...

Most word processing systems come one way. Take it or leave it.

But WordMARC™ comes as sophisticated and powerful as you could ask for in its Composer™ version. Or as simple as word processing can get in its Author™ version.

Composer is perfect for preparing and editing long, complex documents, with automatic functions perfected for large companies, the legal, engineering and scientific professions.

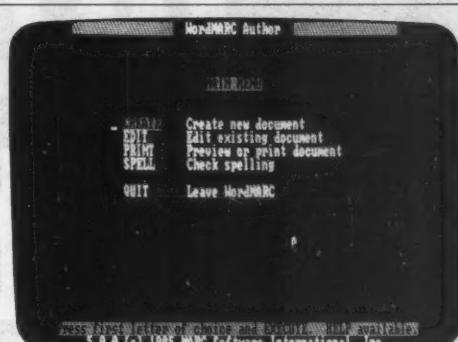
It will automatically create a table of contents, index, number paragraphs and sections. It will

automatically float footnotes. It will create multiple levels of super and subscripts. And Composer provides the industry's most capable list processing.

It will merge documents for editing and printing from various users. And it will display your final document on the screen exactly as it will appear in print.

Compatible with most minis, micros and every IBM®PC, Composer does it all, and makes it all so easy with continuous, on-line help in plain English.

Now, let's move to the next page and look at Author, the executive's word processor.



...or the most
simple.

WordMARC™ Author™ is for people who couldn't care less about the technical side of word processing, but do care about putting their ideas simply and quickly into letters, memos and reports. It's an executive's dream.

If you know how to type, even just hunt and peck, you can use Author.

And for changing sentences around or rearranging paragraphs, you get continuous help in plain English displayed right on the screen. You never have to memorize commands or study a book.

Then, what you've written with Author can be accessed

through WordMARC Composer™ by the word processing professional for editing, merging with other documents if desired, creating indexes, a table of contents, and printing. And because both Author and Composer are totally compatible, you may even transfer Author files created on a PC to Composer operating on a mini-computer. What could be easier?

To learn more about WordMARC Author and Composer, just write or call. MARC Software, 260 Sheridan Avenue, Suite 200, Palo Alto, CA 94306. Call toll free 1-800-831-2400. In California, 1-800-437-9900.

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The Uncommon Denominator

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WordMARC
The Uncommon Denominator

Talk
is Cheap.

It's
Performance
That
Counts.

Today's system software buying decisions will affect your company for years to come.

Before you select a vendor, talk to people you can trust.

If you're about to invest in system software for your mainframe, here's some free advice that may surprise you:

Go slow.

The decision you're making will be felt for years to come throughout your entire organization. So don't try to shortcut the selection process.

And in particular, don't make a decision without talking to people with first-hand experience — the users of the products in question.

Naturally, we believe that Software AG products offer the best solutions available to the problems you face. And we'd like to have an opportunity to convince you — not by competitive claims and counterclaims, but by demonstrated performance in real-world customer sites.

In the meantime, we'd like to offer a few thoughts on some factors that contribute to performance.

Needed: integrated, long-term, worldwide solutions.

If you've been involved in data processing for any length of time, you already know more than enough about the dangers of piecemeal "quick fixes". You don't have to be sold on the value of integrated tools that meet a full range of organizational needs through a common language and shared procedures.

But while many vendors preach integration, few practice it on the scale of Software AG. From our core products, ADABAS and NATURAL, we have created an entire universe of software products that simultaneously meet the needs of everyone from MIS professionals to end users with no computer experience.

We're also integrated in another way — geographically. As more and more organizations seek to coordinate resources and data on a worldwide basis, they need a caliber of support that is consistent worldwide. Software AG's reach is unique among independent software vendors — with products installed in 52 countries.

Fourth-generation technology: Who needs it? Who's got it?

A lot of vendors have expended a lot of hot air on the subject of fourth generation languages. And we'd be the last to deny that a well-designed "4GL" can be a phenomenal productivity tool — as much as 10 to 20 times more productive than COBOL, for instance.

But if you want to see perfor-

mance in a fourth-generation system, not just a language, the list of contenders narrows way down. We suggest starting with any of the 400,000 programmers who've been using NATURAL since 1979.

It's the world's most widely installed, widely used fourth-generation language. NATURAL is far more than a language. It is a completely integrated environment that can handle from the complex to the simple using a common syntax.

Industry surveys repeatedly rate Software AG #1.

It's one thing for a vendor to be proud of its products. It's another for an entire industry to share in that high regard.

Yet for the last three years, that's just what happened. Each time the ballots have been counted in the annual *Datamation* survey, Software AG has come out #1 in product satisfaction. That's performance.

Software AG: high-performance vendor to over 2000 customers.

You could say that the reason we do so well in surveys is that they receive so many responses from our customers. And you'd be right.

Because system software is a long-term investment for most organizations, it inevitably carries with it a long-term relationship with the software vendor.

And for many years, we and our users have recognized the importance of that relationship. In fact, we have worked together to shape it in the interests of delivering the best possible product performance.

But while we're glad our users take the trouble to respond to surveys, we have no control over their comments.

Which makes it all the more gratifying to see the survey results. And all the more imperative that you hear what users have to say — before you buy.

Just give us a call today. Or send in the coupon. We'll be glad to put you in touch with Software AG users in situations comparable to yours, so you can find out for yourself what industry insiders have known all along:

Anyone can talk. But when it comes to performance, Software AG stands alone.

Call us at 1-800-336-3761.
(In Virginia and Canada, call
1-703-860-5050.)

I'm tired of talk.
Let me see some performance. CW0421

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City _____ State _____
Zip _____ Phone _____
Hardware _____ Software _____

 **SOFTWARE AG**
11800 Sunrise Valley Drive, Reston, VA 22091

NEW PRODUCTS/COMMUNICATIONS

Continued from page 103
delivery system.

The system allows users to originate text and graphics from an IBM Personal Computer and distribute it to multiple sites instantly via satellite.

It incorporates Equatorial's C-120 series Micro Earth Station, a unit consisting of an indoor digital receiver/controller and an antenna. It uses PCC/Systems, Inc.'s CC: Mail electronic mail package.

The software costs \$295 per copy; C-120 Micro Earth Station costs \$3,350, or can be rented for \$130/mo. Transmission fee is \$25/mo per unit for networks with 100 or more locations and \$35/mo per unit for networks with fewer than 100 sites.

Equatorial Communications, 189 N. Bernardo Ave., Mountain View, Calif. 94043.

Denniston & Denniston, Inc. has introduced the **Voice Operated Interface System** (VOIS), a tool kit said to enable users to build voice- or phone-activated applications.

VOIS was designed for use with Texas Instruments, Inc.'s TI-Speech technology. It is a configurable product and allows end users to interact with a computer data base by voice, using a headset or a phone. It can be programmed to deliver phone messages. When used with a TI Business-Pro computer, it can operate seven simultaneous phone lines. It also has a call-forwarding function.

VOIS includes the runtime programming software, which costs \$4,995, and the utility set, which costs \$1,995.

Denniston & Denniston, 3435 N. Kennicott Ave., Arlington Heights, Ill. 60004.

Software

Menlo Business Systems, Inc. has announced **Menlo Mail**, an electronic mail application for Tandem Computers, Inc. Pathway environments.

Menlo Mail is said to provide for messages of up to 99 screen pages. It provides broadcasting features to dynamically defined users groups and allows for the definition of user aliases.

Users are automatically notified of unreviewed messages and can reroute mail to other users.

Menlo Mail provides on-line message and user directories, and each user has a personal electronic work file.

The product is licensed for \$10,000.

Menlo Business Systems, 334 State St., Los Altos, Calif. 94022.

Interlink Computer Sciences, Inc. has introduced the **3711S Gateways** for IBM/Digital Equipment Corp. communications.

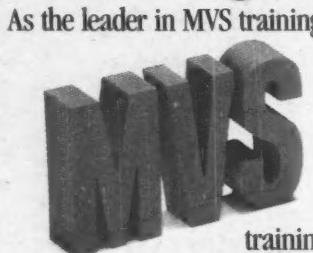
The 3711S Gateway for MVS offers bidirectional file transfer/data access, translation of all data types, and remote job entry interface, interprogram communications and bidirectional terminal emulation packages.

The 3711S Gateway for VM offers bidirectional file transfer/data access, translation of all data types, interprogram communications, an electronic mail bridge and a remote spooling communications subsystem gateway.

Both support IBM and DEC security packages. Pricing starts at \$40,000.

Interlink, 39055 Hastings St., Fremont, Calif. 94538.

Training that fits. To the letter.



As the leader in MVS training, we know an inflexible curriculum isn't the answer in today's XA environments. That's why ASI gives you a way to fit the right course with the student and the training need. It's called the Curriculum Placement Facility. And you'll probably call it the most cost-efficient way ever devised to select and deliver XA training. That's especially important since, with ASI, you'll be choosing from the widest selection of XA courses in the industry.

But maybe XA isn't

the issue. In that case, we should remind you that ASI's choice of SP courses and subjects is unsurpassed. In either case, you'll find ASI courses are delivered using the best medium for the message, whether it's video, CBT, live instructor or the real-world simulation of our exclusive interactive video instruction.

With our Curriculum Placement Facility, complete selection of XA and SP



courses and choice of delivery systems, we cover MVS training from A to Z. Give us a call and find out how ASI can fit your needs to the letter. And why that spells results.



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Applied Data Research, Inc. has announced that **ADR/EMail** now supports peer-to-peer communications through CICS support of LU6.2, part of IBM's Systems Network Architecture.

Release 2.1 allows users to transmit messages across systems with several interconnected CPUs. It also allows users to transmit and receive messages through a telex network directly from their terminals.

Other new features include wide-screen support for creation and display of messages up to 220 characters wide, left and right scrolling commands and a print option allowing selective printing.

ADR/EMail is available for IBM mainframes running under CICS or ADR/Roscoe. It costs \$45,100 for OS environments and \$22,400 for DOS environments.

ADR, CN-8, Rt. 206 & Orchard Road, Princeton, N.J. 08540.

Multiplexers/modems

Gandalf Data, Inc. has enhanced its **Switchmux** networking and switching multiplexer.

The enhancement consists of a new software release said to increase the unit's interconnection capability from 48 devices in a three-node network to 64 devices in a four-node network. It enables Switchmux to multiplex data from a variety of devices that use bit-oriented synchronous protocols such as IBM Systems Network Architecture terminals or CCITT X.25 packet assembler/disassemblers.

The enhanced software is being shipped with all Switchmux units. It costs \$125.

Gandalf, 1020 S. Noel, Wheeling, Ill. 60090.

Gandalf Data, Inc. has introduced the **LDS 120A, MLDS 123 and LDS 2123**, asynchronous local modems for its Pacnet data networking family.

All three are said to offer 19.2K bit/sec. data transmission over privately owned, twisted-pair lines at distances from one to two miles.

The LDS 120A is a compact stand-alone model priced at \$300. The palm-size MLDS costs \$105 and plugs into terminal equipment. The LDS 2123 is a rack-mounted plug-in local modem module for the Pacx 2000.

Gandalf Data, 1020 S. Noel, Wheeling, Ill. 60090.

NEW PRODUCTS/COMMUNICATIONS

Artel Communications Corp. has announced the **Slimline 3270 Multiplexer series**.

The Slimline Multiplexer connects from eight to 32 IBM 3270 Class A devices to a terminal multiplexer. An IBM 3274 controller connects to up to 32 ports to a Slimline Controller multiplexer. The multiplexers transfer data on a RG-62-AU coaxial cable.

Artel Slimline Multiplexers can be used in point-to-point, multidrop or star combinations. One 32-port controller Slimline can communicate with up to four terminal Slimlines.

The Artel Slimline Multiplexer 32-channel model is priced at about \$2,000.

Artel, P.O. Box 100, W. Side Station, Worcester, Mass. 01602.

■

Universal Data Systems has announced the **3270A protocol adapter** and the **TDM-56 multiplexer**.

The 3270A, when combined with an asynchronous ASCII terminal, can substitute for an IBM 3270 controller and display.

The TDM-56 is a six-channel time division multiplexer designed for use on the Digital Data Service network. It features an aggregate bit rate of 56K bit/sec., asynchronous or synchronous substrates and channel speeds from 2,400 to 19.2K bit/sec.

The 3270A costs \$695, and the TDM-56 costs \$1,995.

Universal Data Systems, 5000 Bradford Drive, Huntsville, Ala. 35805.

■

Anderson Jacobson, Inc. has added the **AJ 9601-M** and the **AJ 9601-MD** to its line of 9.6K bit/sec. leased-line modems.

Both were designed for either point-to-point or multipoint operation and are compatible with the CCITT V.29 standard. They offer full-duplex synchronous operation at 9.6K bit/sec. over four-wire, unconditioned dedicated lines.

Fallback speeds of 7.2K and 4.8K bit/sec. can be selected, according to the vendor.

Other features include programmable options such as downline loading, internal security switches and a range of standard diagnostic tests.

In addition, the AJ 9601-MD offers automatic dial backup.

The AJ 9601-M costs \$1,695, and the AJ 9601-MD costs \$1,995.

Anderson Jacobson, 521 Charcot Ave., San Jose, Calif. 95131.

■

Anderson Jacobson, Inc. has introduced the **AJ 9601-F** 9.6K bit/sec. fast-poll modem for point-to-point or multipoint operation.

The modem is CCITT V.29 compatible and provides full-duplex synchronous operation at 9.6K bit/sec. over four-wire, unconditioned leased lines.

The AJ 9601-F features an automatic adaptive equalizer, advanced diagnostics, programmable options and numeric signal quality display.

It also has the ability to read the received signal quality level of individual remote modems. Multipoint network operation is software selectable.

The AJ 9601-F is priced at \$2,095.

Anderson Jacobson, 521 Charcot Ave., San Jose, Calif. 95131.

Inmac has introduced the **Mux 2000, Mod Mux 2000, Mux 10000 and Mod Mux 10000** multiplexers.

The Mux 2000s let users place as many as eight terminals up to 2,000 ft from the host. Mux 10000s will transmit data signals as far as 10,000 ft.

They come with modular hookups. Instead of RS-232 cables, they use snap-in RJ-11 connectors. Mod Mux 2000 and Mod Mux 10000 are compatible and interchangeable with RS-232 versions.

All eight channels on every multiplexer transmit and receive data asynchronously. Speeds range up to 9.6K bit/sec.

The Mux 2000 and the Mod Mux 2000 cost \$395. The Mux 10000 and the Mod Mux 10000 cost \$595.

Inmac, 2465 Augustine Drive, Santa Clara, Calif. 95054.

Local-area networks

L/F Technologies has announced **L/F-Net**, local-area network for its line of 8- and 16-bit multiuser computers.

L/F-Net is said to link multiple L/F Technologies computers and IBM Personal Computers and compatibles to an L/F Technologies multiprocessor system. It transfers data at 1M bit/sec. and features linear bus topology, twisted-pair cabling and a polling utility that prevents data from being lost between nodes.

The network will connect up to 16 workstations per controller. The cost is \$499 per node, which includes a PC half-slot serial card, an interface board and a network software program.

L/F Technologies, 2800 Lockheed Way, Carson City, Nev. 89701.

Network services

Gandalf Data, Inc. has added the **Pacxnet link module**, enhanced management control software and mass termination cabling options to its software-based distributed **Pacx 2000** data networking systems.

The Pacxnet link module consists of several interface cards that allow the logic of Pacx 2000 to be accessed by earlier systems. It costs \$2,500. The enhanced software provides system management control capabilities including the capacity to store multiple system configurations, comprehensive usage statistics and third-party call setup for printer sharing. It costs \$1,000.

There are six mass termination cabling options: direct-connect cables to Switchmox, fan-out cables, punch

Continued on page 108

RUN THE 8600 UNDER \$2.75

THE BIGGEST PRICE PERFORMANCE BREAKTHROUGH IN MEMORY.

The incredible new Nemonix™ 16MB memory board is out to break a few records. For starters, it's priced at only \$44,995, or about \$2.74 per KB. You'll have to pay our competition more than twice that price for the same amount of memory. With Nemonix you save up to 50% on memory costs right from the start.

35% FASTER THAN OTHERS.

Now that we've saved you money, we're going to save you time.

GUARANTEED PERFORMANCE. GUARANTEED FOR LIFE.

Our new 16MB board is so reliable we guarantee it for the life of your computer. On top of that we give

NEMONIX
The name to remember.
See us at Dexpo South
Booth 410.

NEW PRODUCTS/COMMUNICATIONS

Continued from page 107
 blocks, bix blocks, modular splitters for RJ-11 plug-in terminations and unterminated cables for custom applications.

Gandalf Data, 1020 S. Noel, Wheeling, Ill. 60090.

Inmac has announced the **Multi-Purpose Line Driver**.

The line driver is said to allow terminals to be up to 10 miles from the CPU and will transmit at 2,400 bit/sec. If the terminals are within six miles, data will be sent and received at 9.6K bit/sec. At distances up to one mile, transmission speed is 19.2K bit/sec.

The line drivers are compatible with synchronous, asynchronous and isochronous equipment and with RS-232 terminals and peripherals.

The Multi-Purpose Line Driver is priced at \$475.

Inmac, 2465 Augustine Drive, Santa Clara, Calif. 95054.

SYSTEMS & PERIPHERALS

Processors

Preston Scientific has announced the **Sdac16 D/A** digital-to-analog conversion system for multichannel data systems.

The system features 16-bit resolution, dual rank input registers and 500 KHz input data update rate.

Data distribution to the first rank storage registers may be transferred at speeds up to 1 MHz.

Up to 32 Sdac16 converters may be installed in a rack-mounted chassis.

A typical 32-channel system is priced at \$27,000.

Preston Scientific, 805 E. Cerritos Ave., Anaheim, Calif. 92806.

Terminals

Term-Tronics has added the **M-179** color display terminal to its IBM 3270 plug-compatible line of products.

The M-179 is IBM 3179 plug-compatible and offers both four- and seven-color capacity on its 14-in. screen.

It has a 122-key keyboard that allows downloadable keyboard configuration controls.

The color display terminal may be configured with Term-Tronics' 3274 control units or any IBM plug-compatible controller.

The M-179 costs \$2,099.

Term-Tronics, 4990 Viewridge Ave., San Diego, Calif. 92123.

Video, Inc.'s **Covid** has announced its **Model 460** video interface for the IBM Enhanced Graphics Adapter

and other color computers and terminals.

The interface is said to provide quality output, allowing the user to connect a CRT to specialized data projectors or special large-screen monitors for display.

The 460 will convert transistor-transistor logic-level signals from the computer into analog RS-170-type video signals.

The Model 460 costs \$450. Video, No. 4, 2400 W. 10th Place, Tempe, Ariz. 85281.

Printers/plotters

Infoscribe, Inc. has introduced the **Model 1100T**, a Tempest version of its Model 1100 serial dot matrix computer printer said to meet Nascim 5100A specification for shielded operation.

The Model 1100T offers print speeds of 200 char./sec. for draft-quality printing, 100 char./sec. for correspondence-quality printing and 40 char./sec. near-letter-quality printing.

The Model 1100T printer costs \$2,980.

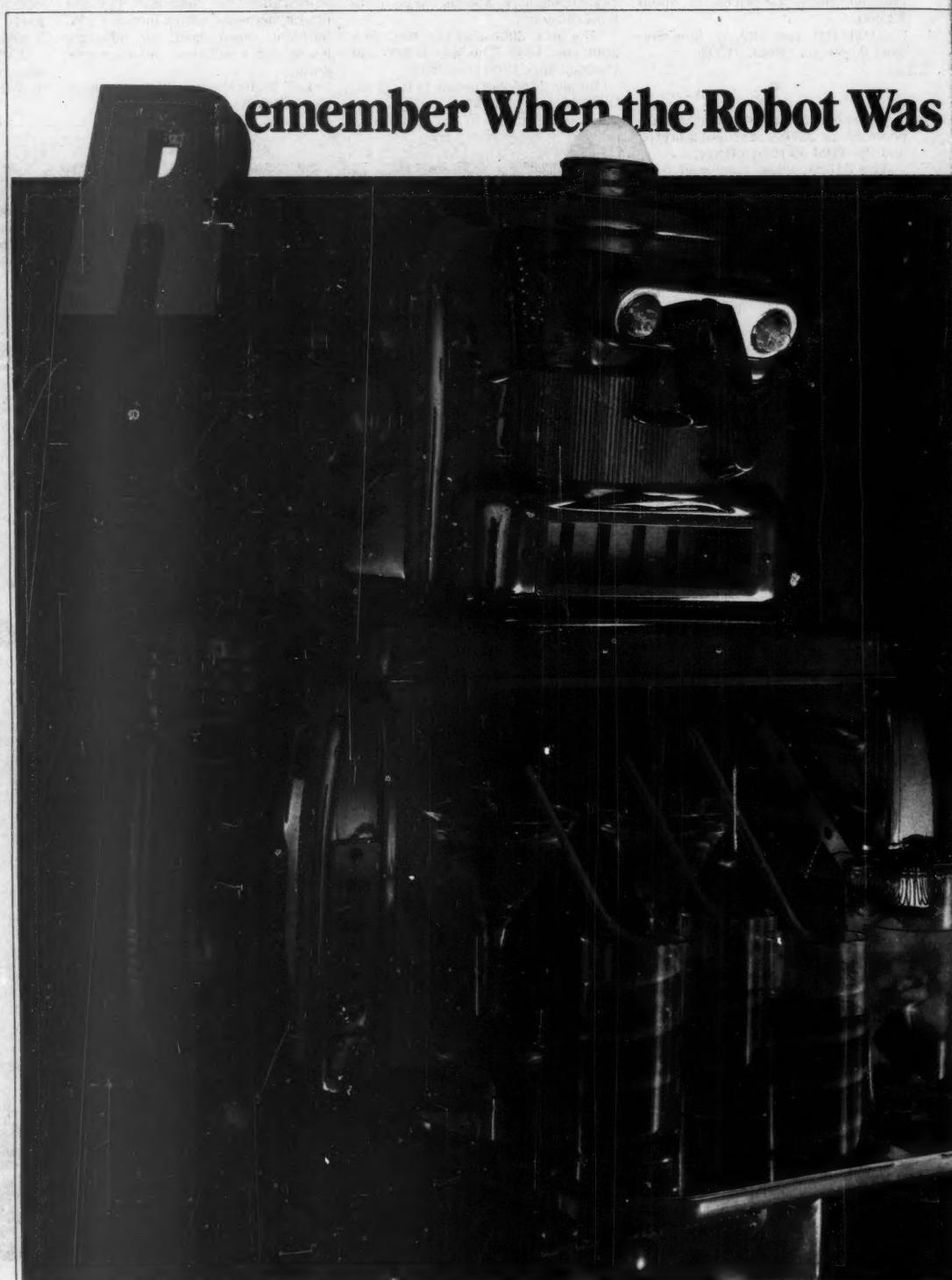
Infoscribe, 1808 Michael Faraday Court, Reston, Va. 22090.

crographics processors.

The adapter is said to make the Burroughs computers compatible with the IBM 3211 printer or any compatible; Xerox Corp. 8700 and 9700 laser printers; and Bell & Howell Co., Datagraphix, Inc., Eastman Kodak Co. or NCR Corp. 5300 microfilm and microfiche processors.

The Universal Subsystem Adapter costs \$7,500.

Spur Products, 13469 Beach Ave., Marina Del Rey, Calif. 90292.



NEWS



CALENDAR

WEEK OF APRIL 27

APRIL 27-29, MONTEREY, CALIF. — Document-Based Optical Mass Memories. Contact: Institute for Graphic Communication, 375 Commonwealth Ave., Boston, Wis. 53203.

APRIL 28-29, MILWAUKEE — Uninterruptible Power Systems: Design, Selection and Specification. Contact: John T. Sneider, Center for Continuing Engineering Education, University of Wisconsin-Milwaukee, 929 N. Sixth St., Milwaukee, Wis. 53203.

APRIL 28-30, ALBUQUERQUE, N.M. — Integrated Fiber-Optic Technology Training. Contact: Linda Castle, Optoelectronic Sys-

tem Consultants, P.O. Box 35525, Albuquerque, N.M. 87176. Also being held June 23-25 in Albuquerque.

APRIL 28-30, AVIGNON, FRANCE — Sixth International Workshop on Expert Systems and Their Applications. Contact: Jean-Claude Rault, Agence de l'Information, Tour Fiat — Cedex 16, 92084 Paris — La Défense, France.

APRIL 28-MAY 2, RENO, NEV. — Use, Inc. Spring Computer Conference. Con-

tact: Use, Inc., Box 461, Bladensburg, Md. 20710.

APRIL 28 to MAY 2, VANCOUVER, B.C. — Congress '86 — Annual Conference of the Canadian Information Processing Society. Contact: Sunny L. Kae, Congress Chairman, P.O. Box 86279, North Vancouver, B.C. V7L 4J8.

MAY 1-2, TEMPE, ARIZ. — Logic Programming and Its Applications in Expert Systems. Contact: Center for Professional Development,

College of Engineering and Applied Sciences, Arizona State University, Tempe, Ariz. 85287.

WEEK OF MAY 4

MAY 5-7, GENEVA — Second World Congress of Production and Inventory Control. Contact: World Congress Secretariat-2F, 500 W. Annandale Road, Falls Church, Va. 22046.

MAY 5-7, WASHINGTON, D.C. — Twelfth Annual Federal DP & Communications Conference. Contact: Linda M. Yodel, The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194.

MAY 5-7, WILLIAMS-BURG, VA. — AM/FM International Regional Conference On Automated Mapping/Facilities Management. Contact: Barbara Emery, AM/FM International, No. 820, 8775 E. Orchard Road, Englewood, Colo. 80111.

MAY 5-9, NEW YORK — Atlantic Systems Guild Modern Structured Design Workshop. Contact: Palmer Consulting, 353 W. 12th St., New York, N.Y. 10014.

MAY 5-9, SAN FRANCISCO — Harmon Associates Seminars and Workshops. Contact: Harmon Associates, 151 Collingwood, San Francisco, Calif. 94114.

MAY 6-8, ATLANTA — Local-Area Networks. Contact: Trish Stoltz, Department of Continuing Education, Georgia Institute of Technology, Atlanta, Ga. 30332.

MAY 7-9, SCOTTSDALE, ARIZ. — Managing and Motivating For Improved Productivity. Contact: Marilyn S. Bodek, Data Entry Management Association, P.O. Box 16711, Stamford, Conn. 06905.

WEEK OF MAY 11

MAY 11-14, NEW ORLEANS — Association for Systems Management Annual Conference. Contact: Richard B. McCaffrey, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

WEEK OF MAY 18

MAY 19-21, HILTON HEAD, S.C. — Audit Managers Symposium VII. Contact: MIS Training Institute, Inc., 4 Brewster Road, Framingham, Mass. 01701.

MAY 19-21, SAN FRANCISCO — Hammer Forum West: Change and Continuity in End-User Computing. Contact: Michael Hammer, Hammer and Co., Hammer Forum West, Five Cambridge Center, Cambridge, Mass. 02142.

MAY 20-23, ORLANDO, FLA. — Techex '86 AmeriSee CALENDAR page 112

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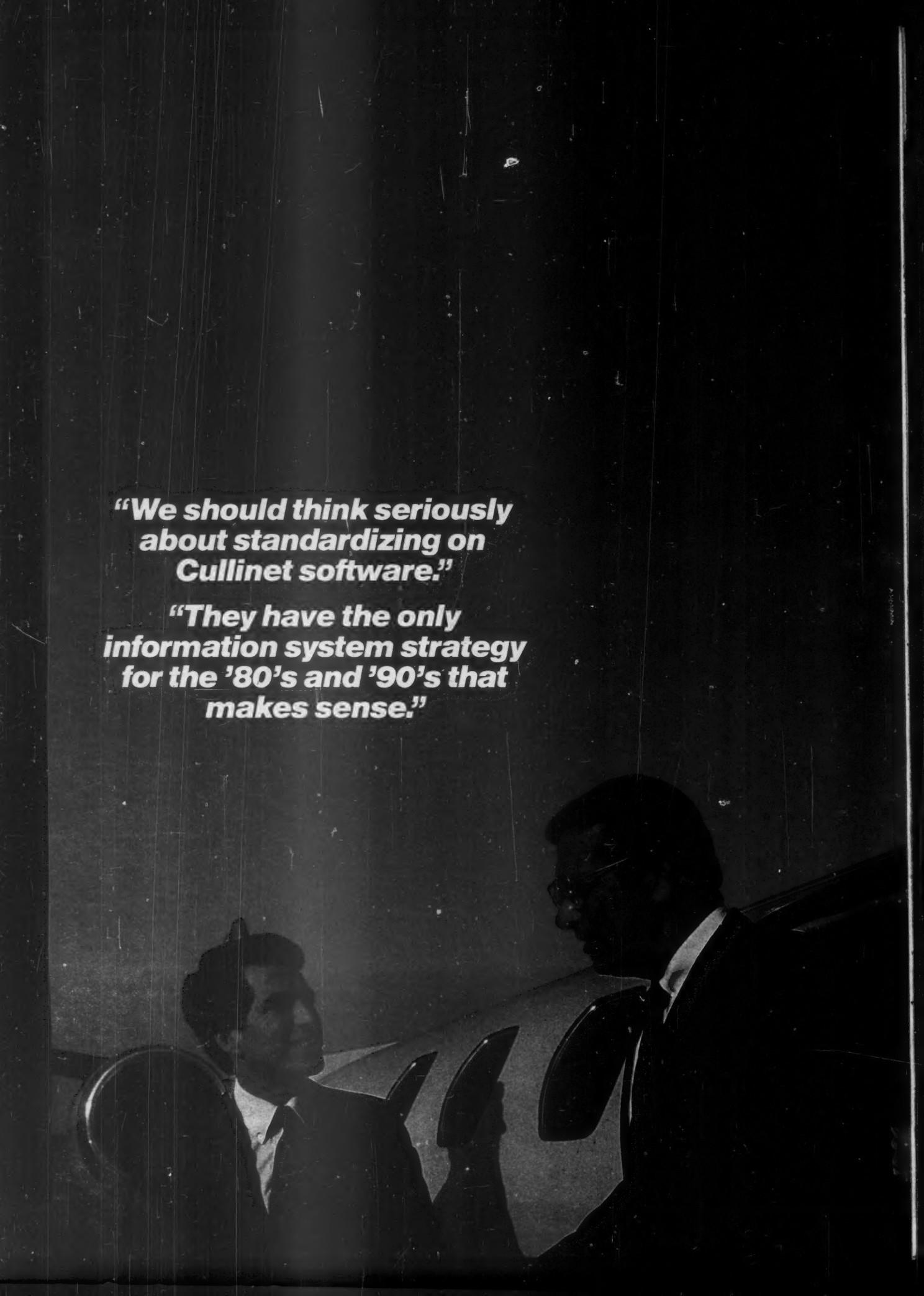
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Clayton Bailey sculpture courtesy of Joseph Channing Gallery.

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NEWS

CALENDAR from page 109
cas: The Annual World Fair for Technology Exchange. Contact: Anne E. Klenner, Dr. Dvorkovitz & Associates, P.O. Box 1748, Ormond Beach, Fla. 32075.

WEEK OF MAY 25

MAY 28-29, WASHINGTON, D.C. — Systems/34, 36 and 38 Users Show. Contact: Andrew Wahtera, The Producers, 360 Merrimack St., Lawrence, Mass. 01843.

MAY 29-30, SAN FRANCISCO — Unix In Focus. Contact: International Data Corp., Suite 201, 3350 W. Bayshore Road, Palo Alto, Calif. 94303.

MAY 29-31, BLACKSBURG, VA. — Personal Computer Interfacing For Scientific Instrument Automata.

tion. Contact: Linda Leffel, Virginia Polytechnic Institute and State University, Blacksburg, Va. 24061.

WEEK OF JUNE 1

JUNE 2-5, DETROIT — Vision '86 — Applied Machine Vision Conference and Exposition. Contact: Vision '86 Public Relations, Machine Vision Association of the Society of Manufacturing Engineers, P.O. Box 930, One SME Drive, Dearborn, Mich. 48121.

JUNE 2-5, NASSAU BAY, TEXAS — International Symposium on Ada Programming Language Applications for Space Station Development. Contact: University of Houston — Clear Lake, 2700 Bay Area Blvd., Houston, Texas 77058.

JUNE 4-6, SAN DIEGO — 1986

National Educational Computing Conference. Contact: Susan M. Zgliczynski, National Educational Computing Conference 1986, School of Education, University of San Diego, Alcala Park, San Diego, Calif. 92110.

WEEK OF JUNE 8

JUNE 7, BEIJING — China-Diacta '86: The International Trade Fair for Educational Equipment. Contact: Swiss Industries Fair, Secretariat China Diacta '86, P.O. Box CH-4021, Basel, Switzerland.

JUNE 9-13, SAN DIEGO — MUMPS Users' Group 15th Annual Meeting. Contact: MUMPS Users' Group, Suite 510, 4321 Hartwick Road, College Park, Md. 20740.

JUNE 10-13, ATLANTA — Summer 1986 Unix Conference and Ex-

hibition. Contact: The Usenix Association Conference Office, P.O. Box 385, Sunset Beach, Calif. 90742.

WEEK OF JUNE 15

JUNE 16-20, CAMBRIDGE, MASS. — Managing Information Technology: New Responsibilities in a Changing Environment. Contact: Center for Information Systems Research, Sloan School of Management, MIT, E40-193, 77 Massachusetts Ave., Cambridge, Mass. 02139.

JUNE 17-19, ATLANTIC CITY — Plas-Tech '86. Contact: Delia Associates, P.O. Box 338, Delia Marketing Communications Center, Whitehouse, N.J. 08888.

WEEK OF JUNE 22

JUNE 22-27, PHILADELPHIA — Management Information Systems for Strategic Advantage. Contact: The Registrar, 200 Vance Hall, Office of Executive Education, The Wharton School of the University of Pennsylvania, Philadelphia, Pa. 19104.

JUNE 23-27, AMSTERDAM — Fourth Annual European Fiber-Optic Communications and Local-Area Networks Exposition. Contact: Cheryl MacDonald, Information Gatekeepers, 214 Harvard Ave., Boston, Mass. 02134.

JUNE 23-27, CHICAGO — A/E/C Systems '86: The Computer and Management Show for the Design and Construction Industry. Contact: A/E/C Systems '86, P.O. Box 11318, Newington, Conn. 06111.

JUNE 25-26, COATESVILLE, PA. — Chester County Expo '86: CAD/CAM Conference from Micro to Mini. Contact: Lee Smith, Central Chester County Vocational Technical School, 1635 E. Lincoln Highway, Coatesville, Pa. 19320.

WEEK OF JULY 27

JULY 28-30, RENO, NEV. — 1986 Summer Computer Simulation Conference. Contact: The Society for Computer Simulation, P.O. Box 17900, San Diego, Calif. 92117.

WEEK OF AUGUST 17

AUGUST 18-22, DALLAS — Thirteenth Annual Conference on Computer Graphics and Interactive Techniques. Contact: SIGGRAPH '86, Smith, Bucklin & Associates, Inc., 111 E. Wacker Drive, Chicago, Ill. 60601.

WEEK OF SEPT. 7

SEPTEMBER 9-12, ANTWERP, BELGIUM — Second European Simulation Congress. Contact: The Society for Computer Simulation, c/o Ghislain C. Vansteenkiste, Professor of Engineering, University of Ghent, Coupure Links 653, B-9000 Ghent, Belgium.

WEEK OF SEPT. 14

SEPTEMBER 18-19, MONTREAL — Canadian Office Machine Dealers Association/Candex. Contact: Roy Whited, Candex Conference, Inc., 47 Lakeshore Road E., Mississauga, Ont. L5G 4L7.

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COMPUTER INDUSTRY

Section begins on page 142

NEC to see Intel in court next week

Trial will decide if microcode is copyrightable

By Maura McEnaney

SAN JOSE, Calif. — After nearly two years of arguments and thousands of pages of legal documents, the long-standing battle over copyright infringement between chip makers Intel Corp. and NEC Corp. subsidiary NEC Electronics Corp. goes to court next week in a trial that will attempt to determine whether microcode is copyrightable.

Jury selection is scheduled to begin next Monday in U.S. District Court for Intel's suit against NEC Electronics over alleged copyright infringements on Intel's 8086 and 8088 microprocessors.

The suit stems from NEC's April 1984 introduction of the V series of microprocessors, considered to be supersets, or enhanced versions, of Intel's products.

NEC's product introduction set off a series of suits and countersuits between the

two companies over what constitutes infringement. The outcome of the case could have significant impact on semiconductor companies that now license manufacturing rights from other vendors in a process called second sourcing, industry observers say.

If the court rules the microcode is copyrightable,

"The outcome of the case could have a significant impact on semiconductor firms that now license manufacturing rights from other vendors."

"There would be no second sourcing without a license," NEC attorney Bob Hinckley said.

"If the court says microcode is not protectable by copyright, that could have implications on programming at a higher level, such as in

the design and development of compatible operating systems," said Allen Grogan, an attorney with Blanc, Gilburne, Peters, Williams and Johnston, a Los Angeles firm specializing in computer law.

NEC fired the first shot in the case with a December 1984 suit against Intel responding to rumors that Intel planned to file suit against the Japanese company. That suit sought a ruling stating that Intel microcode is not copyrightable, that its copyrights are not valid and that NEC did not infringe on any Intel copyright.

Two months later, in February 1985, Intel fired back, alleging NEC infringed on its copyrights with the introduction of the V series of processors. NEC maintains, however, that the microcode, or set of instructions used in the microprocessor, is not copyrightable because it constitutes part of the computer and cannot be changed.

Judge William Ingram will preside over the case, which now applies to NEC's most recently announced 16-bit product line, the V40 and V50 series.

Intel taps four firms for 80386 compilers

By Maura McEnaney

SANTA CLARA, Calif. — Four systems software companies were recently tapped by Intel Corp. to develop language compilers for Intel's 386 32-bit microprocessor.

Silicon Valley Software, Inc. of Cupertino, Calif., will develop Fortran, Pascal and C compilers for the 386 running the Unix System V operating system.

The compilers support functions that will allow source code to be transported between host systems.

The compilers will perform symbolic debugging and generate code for Intel's 80387 numerics coprocessor or Weitek Corp.'s 1167 floating-point chip set.

Language Processors, Inc. of Waltham, Mass., plans to develop Cobol, Fortran, C, Pascal, PL/I, RPG-II and Basic compilers for the 386.

The Language Processors compilers use a common optimizer with functions that allow users to select various levels of optimization to reduce program execution

time. A polyglot programming capability is said to allow software developers to switch between languages within a single program.

In addition, Language Processors will offer an interactive source-level debugger with the 386 compilers, which reportedly will permit program testing and debugging using source language symbols.

Ryan McFarland Corp. of Rolling Hills Estates, Calif., has announced it will port its certified standard Fortran and Cobol compilers to the 386. The company's RM/Fortran implements the ANSI X3.9 1978 and performs local and global optimizations. RM/Cobol-SX is an ANSI X3.23 compiler.

Both products support mainframe extensions and symbolic debugging capabilities.

Also tapped by Intel was Green Hills Software, Inc. of Glendale, Calif. The company plans to develop Fortran, C and Pascal compilers for the Intel 386 microprocessor.



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Merger activity registers 1985 record of \$5 billion

Megadeals strike communications mart

By Alan Alper

FRENCHTOWN, N.J. — Spurred by an increasing number of so-called "megadeals," a record-setting \$5 billion dollars worth of mergers and acquisitions were transacted last year in the computer/communications industry, up 10% from the previous year, according to a study conducted by the Cerberus Group, Inc.

Megadeals, defined by transac-

tions carrying a price tag of \$50 million or more, numbered a record-breaking 22, compared with 12 in 1984, the report said. The aggregate value of these deals was \$3.5 million, accounting for approximately two-thirds of the total.

Because of cyclical factors, however, Cerberus Group Senior Partner Charles Varga said he believes that merger and acquisition activity will slow somewhat in 1986.

"We'll probably see at least 200 deals this year, not the almost 300 which occurred last year," Varga noted. "But I said the same thing in 1985 after a record-setting 1984 and was wrong. There was a record number of divestitures last year, and the economic recovery was not as strong as was projected."

Even though merger and acquisition activity this year is not expected to be as brisk as in 1985, Varga said, the dollar value of individual deals will continue to increase. Corporations are paying 50% more than they were a decade ago, he said, because of the pervasive effect information processing and communications technologies have on almost every facet of their business.

"At least 30% of the deals are done by companies outside the [computer/communications] industry," he noted. "Potential buyers perceive that such know-how is harder to replicate in-house at a lower price than it is to purchase."

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"They'd rather buy a mousetrap now than spend an inordinate amount of time and resources to do it," he said. "They'd like to prevent the usual MIS story where projects are 50% late and 100% over budget."

Among the 1985 megadeals were Dow Jones & Co.'s purchase of Telerate and MCI Communications Corp.'s acquisition of Satellite Business Systems, both valued at \$460 million. Other major deals included American Express Co.'s takeover of First Data Resources, Ameritech's purchase of Applied Data Research, Inc. and the acquisition of Mohawk Data Sciences Corp. by two investor groups, Welsh, Carson, Anderson & Stowe and J.H. Whitney & Co.

A record number of 290 mergers and acquisitions were reported last year, up 13% from 1984, the report noted. Merger and acquisition activity reached a fevered pitch in the second and third quarters, with 82 and 83 deals consummated, respectively. The pace slowed dramatically in the fourth quarter, however, with only 49 deals reported.

"The fourth quarter historically has been a slow time for mergers and acquisitions," Varga said. "Momentum from the previous year usually carries into the first and second quarters as buyers race to look at companies. By the fourth quarter, things slow up."

Regarding possible megadeals this year, Varga is not expecting deals of the magnitude of General Motors Corp.'s acquisition of Electronic Data Systems Corp. "The only big one, Citicorp's proposed acquisition of Quotron Systems, Inc., seems to have fallen apart," he said.

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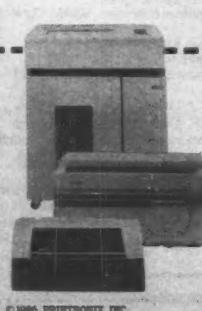
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EXECUTIVE REPORTS

Special Editorial Features

Every issue of Computerworld presents either a Product Spotlight or Executive Report. For advertisers it's still not too late to take advantage of the hot topics set for May!

Disaster Recovery (Product Spotlight, May 12) How to create the master plan that should be in place in the event of DP-center disaster. Focus on procedures, assembling and training a recovery team, and defining critical applications. Also, features on evaluating the recovery site and the role of telecommunications. Spotlight chart lists disaster recovery site providers. Closing date April 25.

Electronic and Voice Mail (Executive Report, May 19) Users of state-of-the-art equipment talk about the problems and benefits of installing these systems. Focus on the "elusive" integrated electronic/voice mail system — is there such a system now, and who is driving its introduction (end user or MIS/DP?). Plus, value-added network services. Closing date May 2.

In-house Publishing (Executive Report, May 26) Focus on the MIS manager's role in corporate electronic publishing. From host-based systems to departmental networks and stand-alone desktop publishing systems. Looks at integration in host-based systems and the role of the IBM PC and Apple Macintosh. Closing date May 9.

And here's what's scheduled for June and July:

ISSUE	TOPIC	CLOSING DATE
June 2	Word Processing Software (Product Spotlight)	May 16
June 16	The BUNCH Companies (Executive Report)	May 30
June 23	Personal Computer Graphics (Product Spotlight)	June 6
June 30	Integrated OA Systems (Executive Report)	June 13
July 7	Data Security (Executive Report)	June 20
July 14	Expert Systems (Product Spotlight)	June 27
July 21	PBX Networks (Executive Report)	July 3
July 28	Management Training for DP Executives (Executive Report)	July 11

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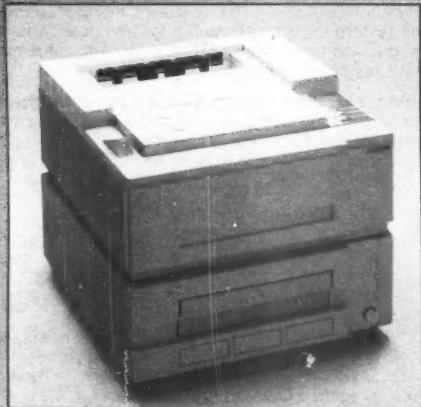
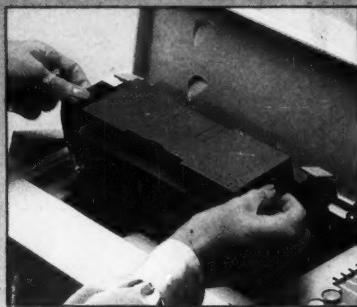
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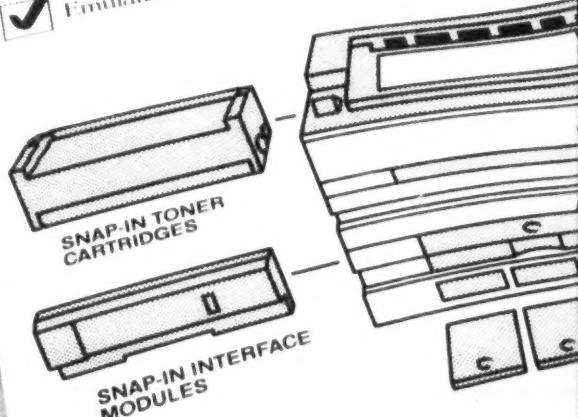


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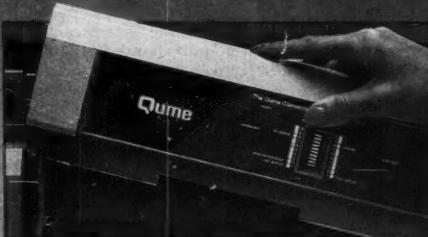
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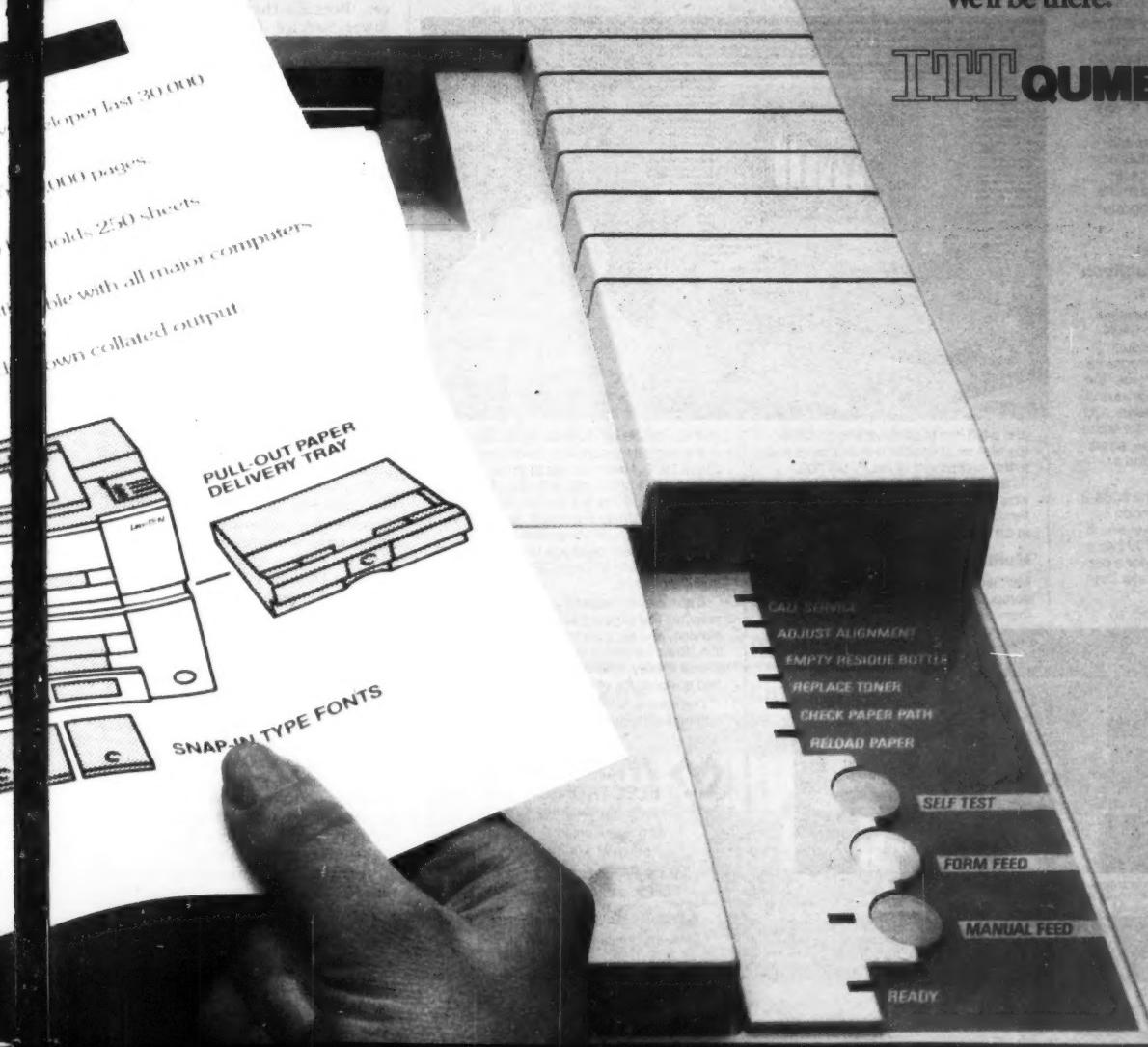
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COMPUTER INDUSTRY

Third-party service group seeks vendors' cooperation

Sets goal of access to parts, documentation

By James A. Martin

ATLANTA — If third-party hardware maintenance companies are to take full advantage of potentially huge markets, they must join forces to challenge effectively the large computer vendors that do not make spare parts and equipment documentation available to them.

That is the credo of the National Computer Services Network, which took a step closer toward achieving that goal with its first membership conference, held recently. About 125

representatives of both fledgling and established third-party service firms attended sessions and exchanged ideas on how to beat their formidable competition — the large vendors that do not cooperate with small, third-party service companies.

Many hardware vendors have not taken kindly to independent service firms, withholding discounts on spare parts or refusing to do any business with them whatsoever [CW, Oct. 21]. This presents a major challenge to the independent service industry and has placed what it considers to be unfair restrictions on its growth.

The group was organized in Washington, D.C., last year to bring mem-

bers together to form a unified voice in speaking out against this problem.

'We want to be recognized'

"The objective here is not to represent so much of a challenge to the large vendors but to show that this business is a reality and that we want to be recognized," said National Computer Services Network Chairman Richard Intile, vice-president of Computer Maintenance Corp. of East Rutherford, N.J.

Exactly how to overcome this dilemma is not clear at this point. One method is to lobby Congress and the Federal Trade Commission (FTC), informing them of the problems in the industry and the need for solutions.

But an industry class action suit is not a likely solution to the problem, according to W. James MacNaughton, a Morristown, N.J., attorney who spoke on legal options at the conference. "For a class action suit, the players have to be in the same boat, but each player here has a separate market niche, whether it is geographically or in products," MacNaughton said.

MacNaughton said joint lawsuits from two or more independent service companies as well as continued lobbying efforts aimed at Congress and the FTC might prove more effective. The key to success, however, will be how well the organization and the industry it represents can band together. "There needs to be a demonstration that this is an industry-wide problem," MacNaughton said. "One company going to the Justice Department doesn't have that much clout. Trade groups are much more effective in addressing common legal problems."

Many third-party service firms are taking the problem to their custom-

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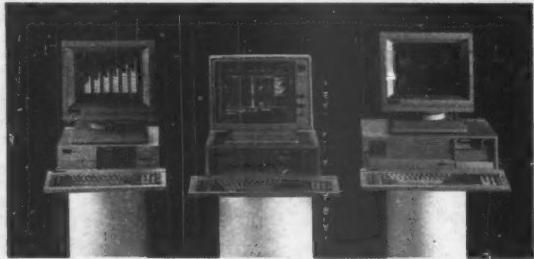


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ers. Because they are able to offer lower service fees than hardware vendors, third-party companies are hoping to persuade customers to switch to or stay with equipment supplied by the few vendors such as IBM that do cooperate with them [CW, Jan. 27].

"Because of this, many large vendors are beginning to feel the competitive pressures. As a result, they are going to have to open up a little bit in this area," said Al Andrus, president of Grumman Systems Support Corp. of Woodbury, N.Y., and a National Computer Services Network director.

Despite the barriers created by the leading hardware vendors, the third-party service industry continues to show solid growth. It grew into a \$1 billion industry in 1985 and should expand another 15% to 20% this year, according to D.R. MacNaughton, president of Business Development International of Franklin Lakes, N.J.

MacNaughton, a consultant and the father of lawyer W. James MacNaughton, said he sees no solution to the problem of large vendor cooperation in the near future. "It won't come in 1986 or 1987. The large vendors won't give up without a lot of court tests," he said.

MacNaughton said lawsuits from independent service companies will be needed in order to focus attention on the issue because the Reagan administration generally is not interested in placing any new governmental restrictions on business.

The National Computer Services Network has a good chance as any trade group in trying to rally support for its causes among legislators and industry members, according to several conference attendees.

"I think the organization has gotten off to a good start," said Fred Hall, a group member and an engineer with CACI, Inc., of Arlington, Va. "But it is much too early to say if they have been successful or not. It's all really just getting started."

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COMPUTER INDUSTRY

Analysts on a Blue streak

From page 142

from year-earlier levels, apparently proving that Big Blue's fourth-quarter windfall mainly reflected a lot of buy-before-year-end MIS decisions as well as IBM's own all-out effort (which fell short) to post full-year profit growth.

Meanwhile, Chairman-Elect and CEO John Akers continued to emphasize words like "caution" and "uncertainty" in commenting on the results. With most companies, that's a corporate euphemism for "We're in trouble," but in IBM's case, the analysts are actually talking more optimistically than the CEO.

Despite some notable contrarians who honestly believe that the trend to networked, microprocessor-based systems at the expense of mainframes will be IBM's downfall, most observers say IBM will do whatever it has to do to succeed — and it will.

One example, February's price cuts, didn't make recent full-price purchasers of the discounted boxes very happy, but they should serve to perk up demand. "If they don't," says Robert Fertig of Enterprise Information Systems, Inc., "IBM will cut again, which will really put the squeeze on the competition."

While few say that Big Blue can post 15% annual growth to reach \$100 billion in revenue by the end of the decade, there is every reason to

be bullish on IBM — in the context of a slower computer market overall. IBM's sluggish first quarter is the most telling sign that the industry itself is not out of the woods.

But the analyst community feels that IBM's vaunted power, resources and product cycles are fully poised for a rebound later this year, even if the industry stays in the doldrums. IBM has outperformed the industry before; 1986 will be no exception.

In response to Sperry Corp.'s recent institution of operating system license fees for third-party mainframe buyers, brokers of Sperry equipment are moving to protect themselves. While still hoping that Sperry will reconsider the policy, they are adopting what amounts to an indemnification clause in their contracts. "We basically quote two prices, one of which includes the software charge," says Robert Newstead, vice-president of Oak Creek Funding Corp. in Phoenix. "That's what we will have to do until this issue is resolved."

It may be just another superficial, wishful-thinking-type of move by a trade group, but the American Electronics Association has formed an import promotion committee jointly with the Electronics Industries Association of Japan (EIAJ). Time will tell if it meets the goal of getting more Japanese firms to buy U.S. electronics gear, but it sure beats the Semiconductor Industry Association bashing heads with the EIAJ over chip-dumping statistics.

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Rethinking software tactics

From page 142

his firm continues to develop micro applications software packages. Computer Associates will unveil new micro software products aimed at the mainframe and retail markets within the next couple of months, which will raise the 10-year-old firm's visibility, Wang says.

But Wang declines to provide specifics, citing corporate policy that prohibits the discussion of new products until they are ready to be shipped. "We will not play the vaporware game," he says.

Wang points to a variety of micro software packages Computer Associates has unveiled over the last year, which he says shows the firm's continued commitment to the micro marketplace. Products such as Easy Plus, a windowing and networking package that supports 3Com Corp., Novell, Inc. and IBM networking schemes as well as new billing, payroll and retail invoicing modules for the firm's accounting series are indications of the firm's dedication to the market, he notes.

Analysts expect the firm to report

profits of about \$18 million, down from the record-breaking \$21.4 million chalked up last year. Although Computer Associates does not break out operating results of its divisions, analysts say the Micro Software Division is only marginally profitable.

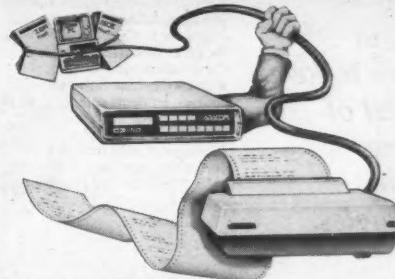
It is the division's continuing poor performance that is said to be causing Computer Associates' Micro Software Division to de-emphasize new applications software development, insiders say. "There's a move toward more product enhancement of late," one Micro Software Division insider laments. "It's really hard, though, to say what it means."

Although Computer Associates continues to unveil micro implementations of a number of its mainframe software products and enhanced versions of its existing micro packages, it has not entered any new market segments of late — in sharp contrast to micro software leaders like Lotus Development Corp., Ashton-Tate and Software Publishing Corp. The firm continues to leverage its strengths in the IBM mainframe software market by asserting dominance in the micro-to-mainframe link business.

As evidenced by its recent site licensing deal with General Electric Co. [CW, Jan. 20], Computer Associates appears to be embracing new

See RETHINKING page 122

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COMPUTER INDUSTRY

Rethinking software tactics

From page 121

methods to increase market penetration of its micro packages. Site licensing, which could boost micro software revenue in the short term, may be insufficient to sustain longevity.

"Computer Associates has been struggling in a tough, competitive environment," notes analyst Brian Mutert of Robertson, Colman & Stephens in San Francisco. "They have done well at site licensing by offering large corporations favorable terms with volume purchases, but that's not a strategy that will help them be a long-term winner."

Although Computer Associates

was one of the first mainframe software vendors to forge links with the microcomputer world, its transition into the applications market segment has been fraught with difficulties.

The firm has built its micro software critical mass through acquisition of companies. In 1983, Computer Associates acquired Information Unlimited Software, Inc., which developed the Easy Business accounting software line. The following year it purchased Sorcim Corp., the high-flying developer of Supercalc. The two organizations make up the bulk of the Micro Software Division.

Micro software revenue has remained in the \$20 million range over the last two years, analysts estimate, a figure that Wang says, without elaborating, is on the low side.

"Micro software revenue for fiscal 1985 was down from 1984, even

though they acquired Sorcim halfway through the year," Mutert says. "If you look at things on a pro forma basis, they should have generated \$25 million."

Wang acknowledges that results have not met management's expectations. "You have to remember, though, that we've grown at an aggregate rate over the last few years of about 50%," he says. "We have large expectations."

Gartner Group's Smith believes that despite tough sledding, Computer Associates will not completely withdraw from the micro applications market.

Known as a bottom-line-oriented firm, Computer Associates is expected to concentrate on niche applications with high profit margins while trying to maximize its advantage in the mainframe-to-micro link area.

INDUSTRY NOTES

Ashton-Tate to sell Javelin

Continuing a trend of major microcomputer software vendors marketing other vendors' products overseas, Ashton-Tate announced it will market and distribute Javelin Software Corp.'s Javelin product outside the U.S. and Canada. Ashton-Tate will distribute the English language version of Javelin through subsidiaries in the UK, West Germany, the Netherlands, Spain, Italy and Australia and distributors in six other countries.

Wang Laboratories, Inc. purchased its South Korean distributor and integrated it into a new wholly owned subsidiary, Wang Computer Korea Ltd. The Seoul, South Korea-based unit will include a plant for manufacturing Wang personal computers and printer interfaces, scheduled to open later this year and to employ 100 workers. The plant will be Wang's seventh outside the U.S. and will join a Taiwan facility as the second in the Far East.

Control Data Corp.'s independent auditors said the company's current financing plans may not be enough to pay its \$383 million short-term debt obligations by the end of this year. The opinion by Peat, Marwick, Mitchell & Co. could put more pressure on CDC to sell more parts of the firm or otherwise obtain added financing. CDC is reportedly close to the sale of its Ticketron subsidiary to New York investment firm Allen & Co.

Baron Data Systems of San Leandro, Calif., announced the acquisition of Sterling Software, Inc.'s Informatics Legal Systems division. Terms were not disclosed. The Phoenix-based law-related software and turnkey systems unit had sales of about \$30 million last year.

Decision Support Software, Inc. (DSS), a small micro software developer in McLean, Va., has filed a \$10.4 million suit against Dow Jones & Co. and one of its market-share subsidiaries, Richard D. Irwin, Inc. DSS claims that the subsidiary fraudulently broke its agreement to market its financial management product, the Accountant Finance Data Base System.

Fairchild Semiconductor Corp. has purchased 5% of San Diego-based Brooktree Corp. in a deal that will allow Fairchild to manufacture Brooktree's line of digital-to-analog and analog-to-digital converters. The \$3.6 million agreement also makes Cupertino, Calif.-based Fairchild a second source for about 20 existing and future Brooktree products. Founded in 1981, privately held Brooktree has approximately 90 employees. The Brooktree purchase represents Fairchild's move away from the large-scale commodity chip market to more specialized products.



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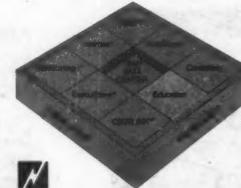
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through they acquired Sorcim half-way through the year," Mutert says. "If you look at things on a pro forma basis, they should have generated \$25 million."

Wang acknowledges that results have not met management's expectations. "You have to remember, though, that we've grown at an aggregate rate over the last few years of about 50%," he says. "We have large expectations."

Gartner Group's Smith believes that despite tough sledding, Computer Associates will not completely withdraw from the micro applications market.

Known as a bottom-line-oriented firm, Computer Associates is expected to concentrate on niche applications with high profit margins while trying to maximize its advantage in the mainframe-to-micro link area.

INDUSTRY NOTES

Ashton-Tate to sell Javelin

Continuing a trend of major microcomputer software vendors marketing other vendors' products overseas, Ashton-Tate announced it will market and distribute Javelin Software Corp.'s Javelin product outside the U.S. and Canada. Ashton-Tate will distribute the English language version of Javelin through subsidiaries in the UK, West Germany, the Netherlands, Spain, Italy and Australia and distributors in six other countries.

Wang Laboratories, Inc. purchased its South Korean distributor and integrated it into a new wholly owned subsidiary, Wang Computer Korea Ltd. The Seoul, South Korea-based unit will include a plant for manufacturing Wang personal computers and printer interfaces, scheduled to open later this year and to employ 100 workers. The plant will be Wang's seventh outside the U.S. and will join a Taiwan facility as the second in the Far East.

Control Data Corp.'s independent auditors said the company's current financing plans may not be enough to pay its \$383 million short-term debt obligations by the end of this year. The opinion by Peat, Marwick, Mitchell & Co. could put more pressure on CDC to sell more parts of the firm or otherwise obtain added financing. CDC is reportedly close to the sale of its Ticketron subsidiary to New York investment firm Allen & Co.

Baron Data Systems of San Leandro, Calif., announced the acquisition of Sterling Software, Inc.'s Informatics Legal Systems division. Terms were not disclosed. The Phoenix-based law-related software and turnkey systems unit had sales of about \$30 million last year.

Decision Support Software, Inc. (DSS), a small micro software developer in McLean, Va., has filed a \$10.4 million suit against Dow Jones & Co. and one of its market-share subsidiaries, Richard D. Irwin, Inc. DSS claims that the subsidiary fraudulently broke its agreement to market its financial management product, the Accountant Finance Data Base System.

Fairchild Semiconductor Corp. has purchased 5% of San Diego-based Brooktree Corp. in a deal that will allow Fairchild to manufacture Brooktree's line of digital-to-analog and analog-to-digital converters. The \$3.6 million agreement also makes Cupertino, Calif.-based Fairchild a second source for about 20 existing and future Brooktree products. Founded in 1981, privately held Brooktree has approximately 90 employees. The Brooktree purchase represents Fairchild's move away from the large-scale commodity chip market to more specialized products.

COMPUTER INDUSTRY

Boole & Babbage set to appeal patent infringement suit

L.A. court ruled patent invalid

SUNNYVALE, Calif. — Systems software vendor Boole & Babbage, Inc. said it plans to appeal a patent infringement case against Candle Corp. of Newport Beach, Calif., after a Los Angeles

Federal Court jury ruled a Boole & Babbage patent to be invalid.

In the somewhat unusual decision, the jury also said several of Candle's system software products infringed upon Boole & Babbage's patented methodology for measuring software performance. However, since the patent was first deemed in-

valid, the infringement decision is essentially moot.

The jury said Boole & Babbage's 14-year patent was invalid because the company waited too long to apply for patent protection on the methodology used in its software products. According to current patent law, companies have one year from the time a product is put on the

market to apply for a patent.

"The net effect leaves both Candle and Boole & Babbage where they were before the decision was handed down," said Boole & Babbage attorney Mitch Zimmerman.

"It is a nondecision in a lot of ways," Zimmerman added.

The U.S. Court of Appeals must first determine Boole & Babbage's methodology pat-

ent to be valid before any infringement actions can be taken against Candle, he explained.

In that case, Boole & Babbage will argue that the patents are valid because the software was only being tested and was not in the public market during the year in question, attorneys said.

— Maura McEnaney



Ask Computer Systems, Inc. reported revenue for the third quarter ended March 31 of \$17.6 million, compared with \$19.2 million in the previous year. Profits were \$1.4 million, or 11 cents per share, compared with \$1.8 million, or 14 cents per share, in the like period a year ago.

Miniscribe Corp. announced revenue for the first quarter ended March 30 of \$40.3 million, compared with \$23.9 million in the like period a year ago. Net income for the quarter was \$4.7 million, or 14 cents per share, compared with a net loss of \$12.5 million, or 67 cents per share, in the previous year.

Seeq Technology, Inc. reported revenue for the quarter ended March 31 of \$8.5 million, compared with \$9.1 million in the comparable period a year ago. The company also reported a net loss of \$4.3 million, or 37 cents per share, compared with a loss of \$4 million, or 30 cents per share, for the same period in the previous year.

Cipher Data Products, Inc. reported revenue for the third quarter ended March 31 of \$40.2 million, compared with \$44.4 million one year ago. Profits were \$1.7 million, or 12 cents per share, compared with \$4.3 million, or 30 cents per share, in the previous year.

Digital Communications Associates, Inc. announced revenue for the third quarter ended March 31 of \$36.5 million, compared with \$23.9 million for the same period a year ago. Profits were \$5.9 million, or 48 cents per share, compared with \$2.7 million, or 26 cents per share, in the like quarter of last year.

Oracle Corp. reported revenue for the third quarter ended Feb. 28 of \$16 million, compared with \$5.5 million for the same quarter a year ago. Profits for the quarter were \$2.1 million, or 15 cents per share, compared with \$141,000, or 1 cent per share, in the previous year.



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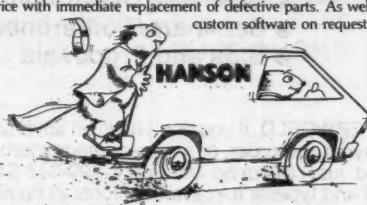
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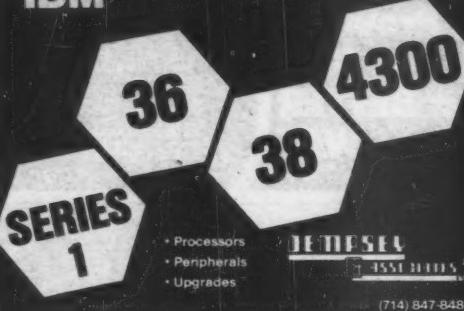
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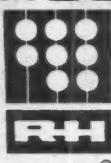
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- Apr 28 - Software Maintenance
- May 5 - Training End Users
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COMPUTER INDUSTRY

Honeywell posts earnings decline

From page 142

expect a significant change in the industry until then," he said.

Wang reported its third straight modest gain in sequential earnings and a 26% rise in profits over its weak third fiscal quarter one year ago. Wang earned \$21.4 million, or 14 cents per share, compared with year-ago net income that fell 66% from 1984 levels. Revenue grew 24% to \$685.3 million. Chairman An Wang said U.S. demand was slow, and such "difficult market conditions" will persist at least through the current quarter.

NCR, on the verge of tomorrow's realignment of its mainframe family for fault-tolerant capabilities, reported better-than-expected first-quarter profits of \$50.2 million, or 51 cents per share, up from 43 cents per share a year earlier. Sales grew 14% to \$960.7 million.

But like Honeywell and IBM, even NCR acknowledged that U.S. growth was modest. NCR attributed its earnings increase to an across-the-board increase in European product revenue, because of both unit sales and the favorable effect of currency rates.

"They also did a good job reducing losses in personal computers and even got their semiconductor business into the black," Milunovich said.

Strong European sales also boosted Lotus' net income to \$11.3 million, or 70 cents per share, up 18% from \$9.6 million, or 58 cents per share, a year earlier. Revenue jumped 55% to \$69.2 million.

"International is our fastest growing division, and we're tapping into some fairly new markets," said spokesman Bruce Rogers.

Microsoft did not disappoint investors in its first public earnings report as profits grew 25% to \$10.6 million, or 42 cents per share, and sales

climbed 24% to \$50.5 million. The Redmond, Wash., firm said it had \$1.4 million in nonrecurring expenses.

Apollo Computer, Inc. posted its second straight modestly profitable quarter after a massive loss in the third quarter of 1985, but earnings trailed well below year-earlier results. Apollo earned \$539,000, or 2 cents per share, compared with \$8.8 million, or 26 cents per share, in the first quarter of 1985. Revenue was flat at \$82 million.

Computer Consoles, Inc. (CCI) posted its fifth straight losing quarter, and Chairman and CEO John F. Cunningham said CCI would not return to the black until the third quarter. The first-quarter loss of \$5.6 million, or 47 cents per share, was about the same as in the year-earlier period. Revenue fell 18.4% to \$21.2 million.

"It's typical for a company in this type of massive transition to take 12 to 18 months to recover," said Laura Peck of L. F. Rothschild, Unterberg Towbin.

Although the semiconductor industry has shown signs of recovery, Advanced Micro Devices, Inc.'s (AMD) touted "Liberty Chip" program apparently has not helped its earnings.

The program's goal to introduce a new product every week for one year appears only to be "a lot of hype," according to Gartner Group, Inc. analyst Richard Billy. Despite a 6.5% increase in sales over the previous quarter, AMD lost \$11 million during its fourth quarter ended March 31, giving the company a \$36 million loss for the year.

On the largest gross profit margin in its history, Apple Computer, Inc. once again reported a huge earnings gain on a decline in revenue. In its second fiscal quarter, the Cupertino, Calif., micro pioneer posted profits of \$31.8 million, or 50 cents per share, compared with \$10 million, or 16 cents a share, a year earlier. Revenue dropped 6% to \$408.9 million, but gross profit margin hit 57%.

sponsored the resolution urging the firm to abandon its computer-related ventures in South Africa as an anti-apartheid protest. Last week, the resolution won AT&T's formal approval.

AT&T's interest in South Africa's computer business is limited to its 25% ownership of Italian computer and office equipment vendor Ing C. Olivetti & Co., which operates a modest sales outlet in the racially splintered country. But whether the outlet has ever sold even one AT&T 3B series machine to South African users is a question that no one at last week's shareholders' meeting could answer with any confidence.

AT&T's South African holdings also include its international long-distance phone services, which the company apparently intends to preserve but will refrain from complementing with any enhanced capabilities, Brown said.

Despite the virtually unanimous industry consensus that AT&T Communications Chairman and Chief Executive Officer James E. Olson will be his replacement, Brown ducked questions about who will succeed him as chairman when he retires in August. "Our board of directors won't announce any replacement until it is ready to do so," he said.

AT&T withdraws from S. Africa

From page 142

sales of computers and office communications equipment continued to be slow. He said the firm's 12% return on equity during the quarter fell short of its goal of a 20% return.

In the first quarter, AT&T's adoption of a revised Federal Accounting Standards Bureau rule for reporting pension expenses added an estimated \$100 million to the firm's profits, which totaled \$530 million, or 47 cents per share. Revenue grew 5.3% to \$8.75 billion. During the same period in 1985, AT&T earned \$354 million, or 31 cents per share, on sales of \$8.31 billion.

Robert Kavner, AT&T's senior vice-president and chief financial officer, also downplayed his company's decision. "Our presence in the computer market over there is so minuscule that I didn't even stop to consider the possible impact of the departure on our finances," he told Computerworld.

Five shareholding employees at AT&T Bell Laboratories had recently

Investors turn bearish on Telex after five strong years



ACTIVE ISSUES

Kathy Porteus

terminals to IBM System/36 and System/38 users, a market that complements its current 3270 business. During its 1987 fiscal year, Telex should also gain a greater presence in foreign markets, Leung says.

"Telex has strong prospects for the next couple of years," says John Rutledge, vice-president with Dillon Read & Co., who currently recommends purchase of the stock. He estimates the company's revenue and earnings in the current fiscal year, ending March 31, 1987, will climb 24% to \$885 million and \$5.70 a share. According to Rutledge, Telex is also attractive because it trades below the price/earning ratio of the average stock. He says he believes the stock sells at a discount because IBM is a direct competitor, not because of a fundamental weakness in the company's performance.

Thomas Linkas, senior analyst with Goldman Sachs & Co., concurs that Telex has a "tremendous track record in a difficult [3270 terminal] marketplace." However, he voices concern about the company's ability to counter slowing growth in the 3270 terminal industry, of which it currently holds an approximately 15% market share.

Linkas cites recent studies by International Data Corp. of Framingham, Mass., that claim both AT&T and IBM have sharply reduced their market growth rate estimates for 3270 terminals. Unlike Rutledge, who says a slowdown in 3270 terminal demand will be serious and long-term, Linkas says his is a "six-to 12-month concern."

According to Linkas, Telex also faces the potential threat of cross-market pricing pressures if personal computer prices succumb to increased PC clone competition and decline more than the usual annual 25%. "At some point, it's got to start influencing 3270 pricing," he says.

"If you believe these concerns," Linkas adds, "then the most you can hope for from Telex this year is a 15% gain in earnings or around \$5.25 a share."

Porteus is president of Strand Research Associates, a Centerville, Mass.-based company that provides customized research services for financial and high-tech firms.

Businessland to buy 36-store retail chain; deal valued at \$75 million

SAN JOSE, Calif. — Continuing its acquisition binge, computer store giant Businessland, Inc. announced plans last week to acquire MBI, Inc., a 36-store retail chain in Rockville, Md. The acquisition, valued at \$75 million, was the second for Businessland in as many weeks.

Earlier this month, Businessland announced plans to acquire the 36-store Amerisource retail chain of Kansas City, Kan., from United Telecommunications, Inc. The merger, if approved, will give Businessland 141 stores throughout the U.S.

The MBI acquisition teams up two of the largest computer retailing chains in the business. Formerly called the Math Box, Inc., MBI esti-

mated annual sales at \$118 million. MBI was the recipient of a \$20 million contract from the U.S. General Services Administration (GSA) to sell computers to the government at specialized computer stores. A Businessland protest on the contract award last month was recently rejected by the GSA.

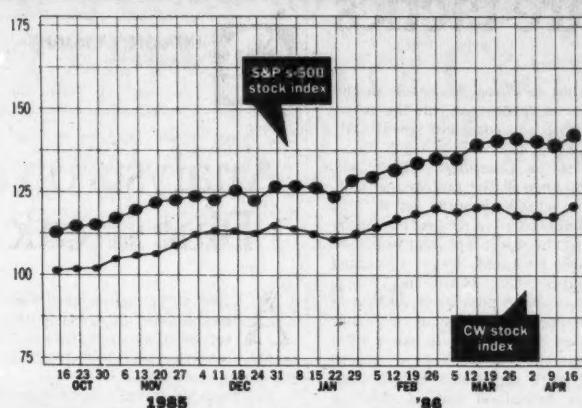
Also this month, MBI acquired 11 computer centers in the Computer South chain in North and South Carolina. Under the terms of the sale, MBI Chairman Avner Parnes will become vice-chairman of the board at Businessland, and MBI President Armen Manoogian will become a Businessland vice-president and director.

— Maura McEnaney

COMPUTER INDUSTRY

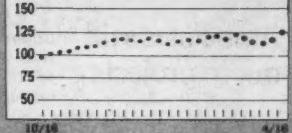
MITCHELL J. HAYES

Computerworld stock trading index

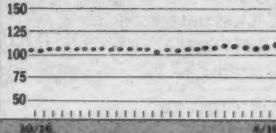


All indexes reflect a historical base of 100 on Dec. 31, 1984, and track stock market performance in relation to that base. The CW stock index represents the unweighted average performance of the six categories of computer industry stocks.

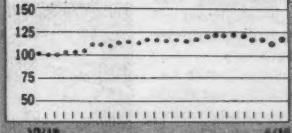
Computer systems



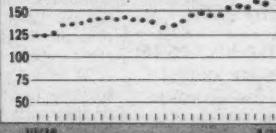
Software and DP services



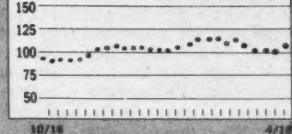
Peripherals and subsystems



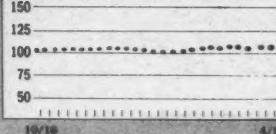
Supplies and accessories



Semiconductors



Leasing companies



Computerworld stock trading summary

CLOSING PRICES WEDNESDAY, APRIL 16, 1986

EXCH	52-WEEK RANGE (1)	PRICE CLOSE APR 16 1986	WEEK CHNGE	WEEK PCT CHNGE	E	52-WEEK RANGE (1)	PRICE CLOSE APR 16 1986	WEEK CHNGE	WEEK PCT CHNGE	E	52-WEEK RANGE (1)	PRICE CLOSE APR 16 1986	WEEK CHNGE	WEEK PCT CHNGE			
COMPUTER SYSTEMS					SOFTWARE & DP SERVICES					PERIPHERALS & SUBSYSTEMS							
O	ALPHA MICROSYSTEMS	5- 9	6 3/8	+7/8	+15.9	O	ADVANCED COMP TECH	2- 5	4 5/8	+1/4	+5.7	P	AM INTERNATIONAL	3- 8	7 1/4	+3/8	+5.4
O	ALTOCS COMPUTER SYST	17- 17	17 1/2	+1/2	+6.1	O	ADVANCED SYSTEMS INC	9-20	18 5/8	+5/8	+3.4	A	ANDERSON JACOBSON	2- 5	2 1/4	+3/8	+1.9
A	AMDAHL CORP	10- 18	18 1/2	+3/8	+2.5	O	AGS COMPUTERS INC	10-25	20 7/8	-3/8	-1.7	O	AST RESEARCH INC	7- 33	19 1/2	+3/8	+1.9
O	APOLLO COMPUTER	5- 31	15 1/2	+1/2	+4.1	O	ANACOMP SOFTWARE	9-15	15 1/2	0	0.0	O	AUDIOPAC TECHNOLOGY	3- 21	4 1/2	+1/2	+10.0
N	AT&T	19- 28	24 1/2	+2 3/8	+10.7	O	ANACOMP INC	2- 5	4 7/8	+1/8	+2.6	O	AVANT GARDE COMPUTING	3- 21	4 1/2	+1/2	+10.0
N	BURROUGHS CORP	52- 71	66	+2 1/2	+3.9	O	ASHTON TATE	5-11	6 1/2	0	0.0	O	BANCITEC INC	6- 12	12 3/8	+1/2	+12.5
O	COMPAG COMPUTER CP	5- 17	15 5/8	+1 1/2	+10.6	O	ASYST COMPUTER SYSTEMS	7-25	13 1/8	0	0.0	O	BEHIVE INT'L	1- 2	1 1/8	0	0.0
N	DATA GENERAL CORPORATION	1- 19	1 7/8	+1/2	+3.2	O	ASTRODyne COMP INC	1- 3	3 1/4	0	0.0	O	BOLZBERANEK & NEW	20- 41	41 1/2	+3/4	+1.8
A	COMPUTER CONSOLES	5- 14	7 3/4	+1/4	-3.1	O	AUTOMATIC DATA PROC	35- 70	70 1/4	+3 3/4	+5.6	O	CAMERON INTERNATIONAL	3- 3	1 1/4	0	0.0
N	CONTROL DATA CORP	15- 39	21 3/4	-3/8	-1.6	O	COMPUTER NETWORK	5- 9	7 1/2	+1/4	+3.4	O	CENTRONICS DATA COMP	3- 11	5 5/8	+1/2	+9.7
O	CONVERGENT TECHNOLOGY	5- 13	10 1/2	+1/2	+3.4	O	COMPUTER ASSOC INT'L	18- 41	40 3/4	+1/4	+3.9	O	CETEC CORP	6- 9	8 1/2	+1/4	+3.0
O	CORE SYSTEMS INC	22- 41	5 1/4	+1/4	+1.0	O	COMPUTER SCIENCES	13- 36	33	+13/8	+4.3	O	CGI CIRTRONICS	4- 7	4 1/2	+1/2	+9.0
O	CRAY RESEARCH INC	25- 74	72 1/4	+1 3/4	+2.4	O	COMPUTER USAGE	1- 3	1 7/8	0	0.0	O	COMPUTER TRANSCEIVER	23- 36	23 5/8	+1/2	+14.2
O	DAISY SYSTEMS CORP	11- 38	14	+2 1/2	+19.1	O	COMPUTER SYSTEMS	3- 11	4 7/8	+1/8	+5.0	O	COMPUTERVISION CORP	9- 44	15 1/4	0	0.0
N	DATA GENERAL CORP	31- 76	41 1/8	+1 1/4	+3.1	O	COMPUTER SYSTEMS	1- 5	1 1/8	-1/4	-2.0	O	CONTRAC CORP	12- 18	16 7/8	+1/2	+3.0
N	DATAPOINT CORP	5- 22	17 3/4	+1/4	+5.0	O	COMSHARE	7- 12	10 1/2	0	0.0	O	DATAPRODUCTS CORP	11- 20	15 1/2	+1/2	+8.9
N	DIGITAL EQUIPMENT CORP	85- 127	175 1/4	+1 1/4	+8.9	O	CENTERA CORP	1- 6	1 1/2	-1/4	-2.8	O	DATA SWITCH CORP	4- 9	6 7/8	+5/8	+10.0
N	ECO INC	13- 16	15 1/2	0	0.0	O	CERNILLIN SOFTWARE	12- 33	12 5/8	+3/8	+3.0	O	DATAUM INC	5- 9	5 7/8	+1/4	+4.4
N	ELECTRONIC ASSOC	3- 7	6 5/8	0	0.0	O	CYCARE SYSTEMS INC	19- 27	27 1/2	+1/2	+1.8	O	DECISION DATA COMPUT	10- 20	11 1/2	+1/4	+2.2
N	FLOATING POINT SYSTEM	18- 41	41 1/8	+1 3/4	+4.4	O	DATAVATION	4- 25	25 1/2	+1/2	+2.7	O	DEUTSCHE COMPUTER	2- 7	1 1/2	-1/4	-7.7
N	FLUXUS INC	22- 37	25 1/8	+1 1/8	+2.8	O	GENERAL ELECTRIC CO	58- 78	78	+17/8	+2.4	O	EVANS & SUTHERLAND	12- 24	23 5/8	+3 1/2	+17.3
N	GOULD INC	20- 38	26	+1 3/8	+5.5	O	GENL MOTORS E (EDS)	20- 48	47 3/4	+13/8	+2.9	O	GANDALF TECHNOLOGIES	5- 13	6 7/8	+1/2	+7.8
N	HARRIS CORP	22- 35	28 3/4	+1	+3.6	O	GTE CORP	38- 54	54 3/8	+2 1/4	+4.3	O	GENTEL DATA COMM IND	8- 21	10 1/8	+1/2	+8.9
N	HEWLETT-PACKARD CO	29- 45	42 1/2	+3/4	+1.7	O	INFORMATION SCIENCE	1- 5	1 1/8	-1/4	-7.4	O	HAZELWOOD CORP	20- 30	20 3/8	+1/2	+0.6
N	HONEYWELL INC	54- 87	76 3/8	+3/4	+5.0	O	INFORMATION SYSTEMS	13- 24	18 1/2	+1/2	+4.4	O	ICON CORP	3- 10	10 7/8	+1/2	+6.8
N	IPL SYSTEMS INC	17- 37	150 1/2	+1 1/2	+3.6	O	INFORION SYSTEMS CP	10- 20	13 1/2	0	0.0	O	INFORMATION INT'L INC	10- 17	13 1/2	+1/8	+0.9
O	ITC CORP	1- 4	2 3/8	0	0.0	O	KEANE ASSOCIATES	25- 43	36 1/4	+1 1/4	+3.2	O	INTECOM INC	3- 11	3 3/8	-1/8	-3.5
N	M/A-COM INC	26- 47	46 1/8	+1 1/4	+3.0	O	KINETIC DEVELOPMENT CP	15- 34	31 1/4	+3 3/4	+13.6	O	MEGADATA CORP	3- 8	3 3/8	0	0.0
N	MANAGEMENT ASSIST	2- 2	1 1/4	0	0.0	O	MINI-SAT COMMUNICATIONS	7- 13	11 1/8	+1/4	+2.8	O	MSI DATA CORP	13- 21	13 1/2	+1/2	+4.4
N	MATSUSHITA ELECTRONICS	49- 85	85	+2 3/8	+2.8	O	MICROGRAPHIC APP GRP	1- 8	1 7/8	0	0.0	O	NET WORKING SYSTEMS CORP	24- 47	47 1/2	+4 1/2	+10.5
N	MENTOR GRAPHICS	13- 30	16 5/8	+2 7/8	+20.9	O	MICROMOTORS INC	12- 35	15 3/4	+3/8	+2.4	O	NO AMERICAN PHILIPS	32- 48	45 5/8	+3 3/4	+8.9
N	MODULAR COMPUTER SYS	6- 8	7 1/2	-1/8	-1.6	O	MICROPROPS INC	2- 2	3 1/8	-1/8	-5.5	O	NORTHERN TELECOM LTD	26- 41	29 3/8	0	0.0
N	MOHAWK DATA SCI	1- 13	13 1/4	+1 1/4	+4.0	O	MONITOR DATA GROUP	8- 24	24 1/2	+1/2	+2.0	O	PARADYNE CORP	6- 18	7 5/8	+1/4	-3.1
N	NCI INC	25- 47	46 7/8	+3 1/4	+7.4	O	ON-LINE SOFTWARE INT	4- 12	11 1/2	0	0.0	O	PENIRIL CORP	7- 14	7 5/8	+1/4	-3.1
N	PERKIN-ELMER	22- 36	32 1/4	+1 1/2	+4.8	O	PANOSPHIC SYSTEMS	14- 32	32	+3/4	+2.3	O	PLESSY CO (ADR)	19- 32	31 5/8	+3/8	+1.1
N	PRIME COMPUTER INC	15- 27	20	+1 1/2	+2.5	O	PLANNING RESEARCH	11- 23	20 7/8	+1/4	+1.2	O	PRINTMEDIA INC	10- 15	18 1/2	+1/2	+5.2
N	SEQUENTIAL SYSTEMS	30- 40	34 3/4	+1 1/2	+13.9	O	PROGRAMMING & SVS	10- 35	16 1/4	+1/4	+1.5	O	TRANSIS INC	6- 16	11 1/2	+1/8	-1.0
N	STRATUS COMPUTER INC	9- 25	22 1/2	+2 1/2	+13.9	O	REYNOLDS & REYNOLD	31- 65	32	+3/8	+1.1	O	RAMTEK CORP	2- 7	4	+1/2	+14.2
N	TANDEM COMPUTERS INC	13- 29	28 1/8	+1 1/4	+18.4	O	SEI CORP	13- 27	25	+1/4	+1.0	O	RECOGNITION EQUIP	9- 17	13	+1/8	+4.9
N	TANDY CORP	24- 44	38 5/8	-1/4	-0.6	O	SHARND MEDICAL SYST	26- 38	38	+1 1/4	+4.4	O	SADDERS ASSOCIATES	30- 44	44 1/2	+1/2	+2.7
O	TELEVIDEO SYSTEMS	10- 30	29 1/2	+1 1/4	+4.2	O	SUPERCOMPUTERS	4- 8	4 1/2	+1/4	+5.8	O	SCAMATIC CORP	9- 22	20	+1/4	+2.5
N	TEXAS INSTRUMENTS	86- 132	128 1/4	+7 7/8	+6.5	O	SOFTWARE AG	12- 22	17 1/2	+3/4	+4.4	O	SCIENTIFIC ATLANTA	10- 15	10 7/8	+3/8	+3.5
N	ULTIMATE CORP	8- 32	30	+1 3/4	+6.1	O	URS CORP	10- 17	17 1/4	+1/4	+1.4	O	SEAGATE TECHNOLOGY	5- 13	12 3/8	+2 5/8	+25.9
O	VECTOR GRAPHICS INC	1- 1	1/8	0	0.0	O	UCCEL	11- 19	19	0	0.0	O	STORAGE TECHNOLOGY	1- 5	3 7/8	+1/8	+3.3
A	WANG LABS 'B'	15- 29	18 1/2	-1/4	-1.3	O	VLSI SOFTWARE	17- 24	22	+2 1/4	+11.3	O	SYNTHETIC DATATRONICS	0- 24	3 3/8	+3/8	+3.3
N	WANG LABS 'C'	13- 29	18 1/4	+3/8	+2.0	O	VM SOFTWARE	17- 24	22	+2 1/4	+8.5	O	A BAR IN THE BOX	5- 9	6 7/8	+3/8	+6.7
N	XEROX CORP	37- 72	65 7/8	+1/4	+0.3	N	ADVANCED MICRO DEV	22- 36	30 3/8	+1 5/8	+5.6	O	TAB PRODUCTS CO	14- 23	22 1/2	+1/4	+1.1
N	AMERICAN BUS PRODS	21- 36	36 1/8	0	0.0	N	ADVANCED SEMICONDUCTOR	7- 11	7	+1/2	+4.7	O	TANDON CORP	3- 9	5 1/4	+1/4	-2.3
N	BARRY WRIGHT	17- 29	22 5/8	+1/2	+2.2	N	ANALOG DEVICES INC	5- 18	23 1/4	-1/4	-1.9	O	TEC INC	6- 13	6 1/4	+1/4	+2.3
N	DUPLEX PRODUCTS INC	13- 22	20 1/2	+1/8	+0.6	N	ANALOGIC CORP	11- 16	12 3/8	-1/4	-1.9	O	TECHNICON INC	4- 18	22 1/2	+2 3/8	+3.8
N	ENVIRON BUS. FORMS	14- 20	20	+1 1/4	+4.4	N	APPLIED MAGNETICS CP	9- 19	17 1/8	+3/8	+2.2	N	TELEX	34- 68	60	+3 1/4	+3.6
N	EMC CORP	74- 107	101 3/4	+3 3/8	+3.6	N	DATAPOINT CORP	18- 26	22 1/4	+7/8	+10.0	N	TIMEPLEX INC	15- 23	15 3/8	+1/2	+3.3
N	MOORE CORP LTD	15- 27	27 3/8	+1 5/8	+6.3	N	HADCO CORP	3- 7	4 3/4	+5/8	+15.1	N	TITAN CORP	4- 11	11	+1/8	-1.1
N	STANDARD REGISTER	22- 45	44 3/4	+1 1/2	+1.1	N	INTEL CORP	21- 33	29	+3	+11.5	N	VISUAL TECHNOLOGY	1- 3	5/8	+1/16	+10.0
N	WALLACE CORP SERVICE	30- 48	47 3/8	+1 1/2	+3.2	N	MICRO MASK INC	5- 12	5 7/8	+1	+20.5	N	CONDISCO INC	7- 23	22 1/2	+1 3/4	+8.4
N					N	MOTOROLA INC	26- 48	48 3/8	+6 1/8	+14.4	N	CONTINENTAL INFO SY	5- 20	18 1/2	+1 3/4	+4.9	
N					N	MOTOROLA SEMICONDUCTOR	16- 33	33	+2 1/2	+8.5	N	FINALCO GROUP INC	4- 5	4 1/8	+1/8	-2.9	
N					N	TERAYDNE	17- 33	27	+2 1/2	+8.5	N	PHOENIX AMERICAN INC	2- 6	5 1/2	+1 3/4	+33.3	
N					N					N	SELECTRIM INC	6- 12	6	+1/4	-1.1		
N					N					N	U.S. LEASING	32- 46	43 1/2	-1 1/4	-2.7		

EXCH: N - NEW YORK; A - AMERICAN; P - PACIFIC; B - BOSTON;

COMPUTER INDUSTRY

INSIDE

The 2-year-old NEC/Intel patent suit goes to trial next week/113

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Telex Corp. slows down after five years of growth, and investors turn bearish/140

INSTANT ANALYSIS

"Sperry has a large installed base and has done a relatively poor job of leveraging it over the past few years."

— Steven Milunovich, First Boston Corp., on Sperry Corp.'s attractiveness as a takeover target

Rethinking software tactics

Computer Associates said to cut new micro projects

By Alan Alper

GARDEN CITY, N.Y. — Computer Associates, Inc., one of the first software vendors to straddle the mainframe and micro-computer markets, may be reassessing the development of new micro applications, sources close to the company say.

In recent weeks, Computer Associates has reportedly suspended the development of a relational data base management product for micros. The product, developed for the last 18 months under the name Superbase, was to have been an extension of the firm's Productivity series, which includes Supercalc and Superplan. It reportedly made use of a sophisticated multiwindowing environment and offered powerful micro-to-mainframe communications facilities.

Computer Associates founder and



Charles Wang

Chairman Charles Wang, however, denies that the firm is retrenching in the micro arena, but refuses to comment specifically on Superbase.

In contrast to Computer Associates' strong performance in the mainframe software market, which accounts for 90% of revenue and almost all of its profits, financial results in the micro applications soft-

ware business have remained disappointing. While the firm is projected to post \$188 million in revenue in the fiscal year that ended March 31, up some 30% from the previous year, micro software sales are believed to have remained flat at roughly \$20 million.

"They would have liked to have gotten out of the micro [applications] market a long time ago but would have lost face, so they continue to carry it on their books," says Scott Smith, an analyst who follows the firm for the Gartner Group, Inc.

Despite such contentions, Wang told *Computerworld* in a recent interview that

See **RETHINKING** page 121

INDUSTRY INSIGHT

Clinton Wilder

Analysts on a Blue streak

After engaging in a lot of IBM-bashing during the first quarter, analysts, investors and computer market watchers are cutting Big Blue some slack.

The positive verbal and stock price responses to IBM's lackluster quarterly results were notable, considering the parade of financial types practically tripping over each other to cut their IBM earnings estimates a few weeks ago. Although the Armonk monolith failed to reach 4% growth in both earnings and revenue, even when compared with year-earlier results that actually dropped from first-quarter 1984, most leading analysts stayed bullish on IBM for the rest of 1986.

On the day the numbers were announced, IBM's stock jumped about three points in early trading, though it slipped later in the day to close slightly down. But when trading resumed Monday, April 14, Big Blue led a strong rally of technology stocks by climbing 2% to 152% — in sight of its 52-week high of 161.

What gives? The first-quarter per-share profit of \$1.65 came in at the lower end of what E. F. Hutton & Co.'s Michael Geran called the widest range of analysts' estimates he's ever seen — and without the weaker dollar, it would have been about \$1.42 per share. IBM's hardware shipments actually declined

See **ANALYSTS** page 121

AT&T withdraws from S. Africa

By Jeffry Beeler

SAN FRANCISCO — AT&T Chairman Charles Brown last week downplayed the significance of his company's recent decision to cease all its computer-related trade with South Africa.

Brown's comments on the market exodus came at a press conference before AT&T's 101st annual shareholders' meeting, where AT&T also announced that first-quarter profits rose 21.4%, excluding a \$100 million windfall from an accounting change.

Brown dismissed as "overblown" last week's prominent press accounts of AT&T's voluntary withdrawal from the South African computer business. "Our in-

volvement in that market is extremely tiny," he said. "We have no real investment, no sales, no customers and no people there."

AT&T also confirmed last week that it will significantly reduce its own computer purchases as part of massive three-year corporate MIS consolidation. AT&T, the U.S.' largest computer user in terms of equipment purchases, will cut the number of its data processing centers by 50%. The company will also reportedly purchase more of its own computers.

Brown attributed the increased operating profit to strength in long-distance services and telephone sales but said that

See **AT&T** page 140

Wilder is Computerworld's senior editor, computer industry.

Honeywell earnings decline; Wang, others reveal gains

Upturn unlikely, but some firms show gains

By Clinton Wilder and Maura McEnaney

Although Honeywell, Inc. felt the effect of a sluggish U.S. computer market with a sharp drop in first-quarter earnings, healthy overseas demand and a weaker U.S. dollar lifted the fortunes of Wang Laboratories, Inc. and other firms in financial results reported last week.

While analysts saw little hope of an industrywide upturn until the second half of the year, there were several bright spots in the financial news. NCR Corp. leveraged strong European sales into a 15% earnings gain; Lotus Development Corp. achieved its first year-to-year earnings gain in three quarters; Microsoft Corp. reported a 25% growth in profits in its first quarter as a public com-

pany; and Seagate Technology, Inc., despite a drop in sales to IBM, posted record revenue and earnings.

Honeywell's overall profits fell 43.3% to \$26.2 million, or 57 cents per share, on only a 1.5% increase in revenue, to \$1.28 billion. But its Information Systems unit suffered a 90% drop in operating profits and a 17% decline in orders, said Steven Milunovich, an analyst with First Boston Corp. Milunovich said year-earlier computer profits were bolstered by a major contract to sell DPS 88 mainframes to General Electric Co.

Honeywell Chairman and Chief Executive Officer Edson Spencer said the Minneapolis firm will also show an earnings decline in the second quarter, based on continued slowness in U.S. demand. He said Honeywell will show "moderate earnings growth" for the year only if the U.S. computer market picks up in the third and fourth quarters. "We don't

See **HONEYWELL** page 140

First-quarter earnings

Company	Net Income Jan.-March, 1986 (thousands of dollars)	Percent Change From 1985	Revenue Jan.-March, 1986 (thousands of dollars)	Percent Change From 1985
Advanced Micro Devices	(11,351)	—	153,381	-23.7
Automated Data Processing	31,860	+21.9	324,259	+18.3
Computer Consoles	(5,621)	—	21,184	-18.4
DEC	170,348	+86.0	1,928,287	+14.0
Honeywell	26,200	-43.3	1,502,000	+1.5
Lotus	11,371	+18.0	69,270	+55.0
Microsoft	10,629	+25.0	50,505	+24.0
NCR	50,231	+15.0	960,774	+14.0
Pyramid Technology ¹	530	+73.2	11,095	+44.3
Seagate Technology	11,833	+598.5	126,978	+214.0
Sun Microsystems	3,386	+3.7	57,578	+37.0
Wang	21,400	+26.0	685,300	+24.0

(Parentheses indicates loss.)

¹ Net income before extraordinary credit.

Information provided by individual companies.

"It's easy to choose a 3270 Protocol Converter. Start with DataLynx®/3274 And measure everything else against it."

Harriett Switzer,
Group Manager

Do the others connect SNA to an X.25 Open System?
Do they understand PC-to-Mainframe communications,
solving your total file transfer problem including high
volume binary data transfer?

Can they generate firmware within themselves, allowing
you to connect just about any async terminal you
want?

Do they have *System Management Mode*,
allowing async terminals to remotely monitor both
async and sync sides of your network? Can they
do address and data traces? Of any sync port?

What about their session security? Can you depend
on it to *really* do the job... day after day?

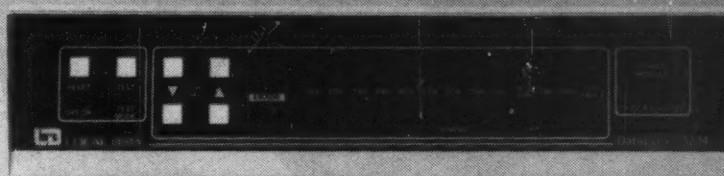
Of course DataLynx/3274 does all this and
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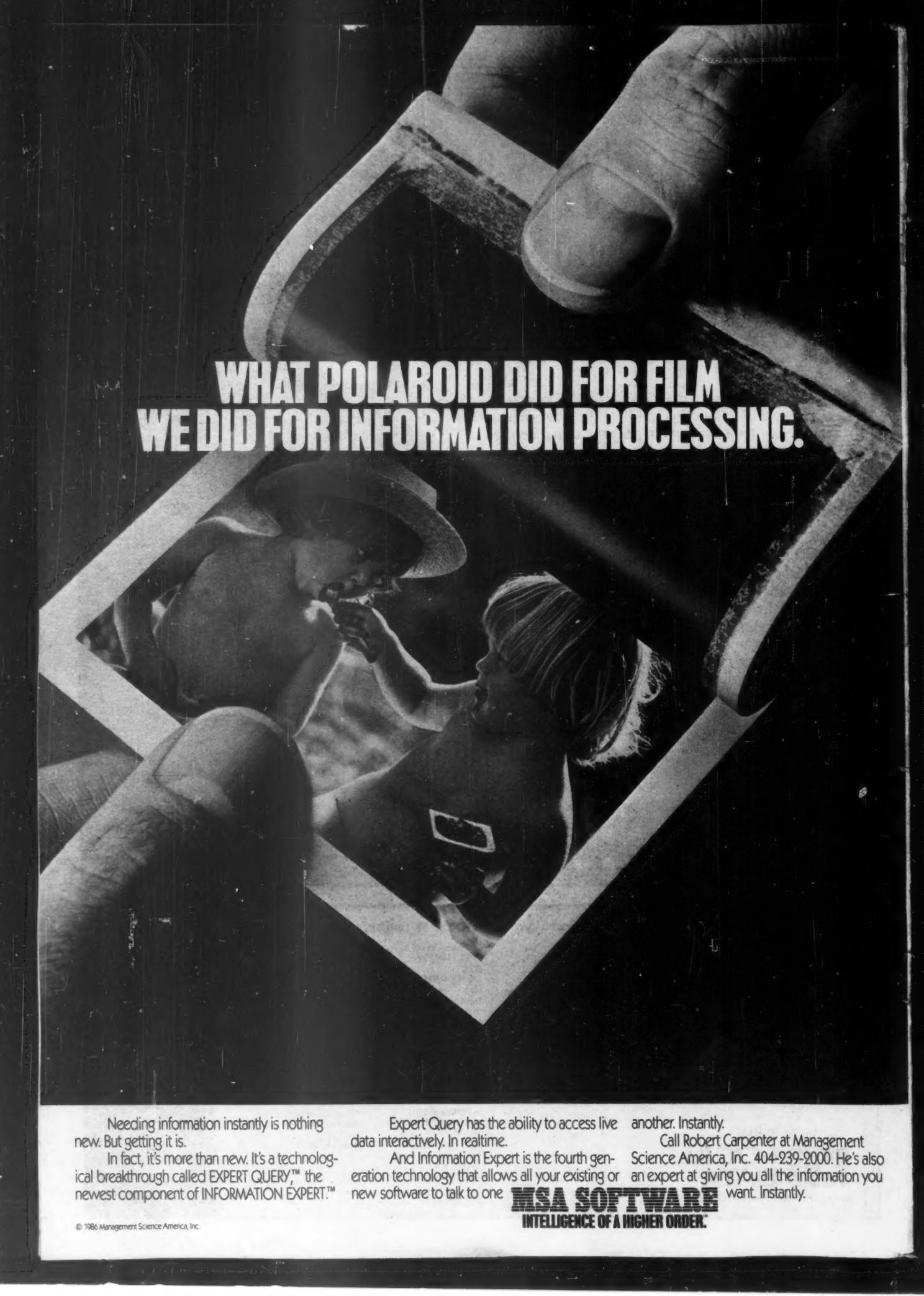
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